AirLink COMMUNICATIONS

Raven EDGE/GPRS

User Guide

cingular raising the bar

Version 2.31 - February 2007

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WARNING

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Important Notice

Because of the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the AirLink Communications modem are used in a normal manner with a well-constructed network, the AirLink modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. AirLink Communications, Inc., accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the AirLink Communications modem, or for failure of the AirLink Communications modem to transmit or receive such data.

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Do not operate the AirLink Communications modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the AirLink Communications modem MUST BE POWERED OFF. The AirLink Communications modem can transmit signals that could interfere with this equipment. Do not operate the AirLink Communications modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the AirLink Communications modem MUST BE POWERED OFF. When operating, the AirLink Communications modem can transmit signals that could interfere with various on board systems. The driver or operator of any vehicle should not operate the AirLink Communications modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

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Software: Software is warrantied for 90 days to work in substantial conformance to applicable software specifications. AirLink's sole obligation is to, at their option, refund the liscense fee or replace the software with other software.

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CHAPTER 1

Introduction to Raven EDGE/GPRS

The Raven's rugged form factor is ideal for industrial and commercial applications that require real-time communications. The Raven provides cellular data communications for a variety of applications, such as telemetry, public safety, SCADA, traffic control, traffic metering, and more.

FIGURE 1. Raven front and back

EDGE/GPRS Overview

EDGE (Enhanced Data rates for GSM Evolution) provides end-to-end packet data services with an enhanced connectivity building on GPRS technology and using the established GSM networks. EDGE provides higher transmission rates and better transmission quality for data than GPRS. EDGE can carry data at speeds typically up to 384 kbit/s in packet mode.

When EDGE/GPRS is not available, your Raven will fall-back to GPRS for the connection to Cingular to provide continued connectivity.

General Packet Radio Service (GPRS) is packet-switched with many users sharing the same transmission channel, but only transmitting when they have data to send. This means that the total available bandwidth can be immediately dedicated to those users who are actually sending at any given moment, providing higher utilization where users only send or receive data intermittently. GPRS provides speeds of 30–70 kbps with bursts up to 170 kbps.

Establishing an Internet Connection

The Raven uses Cingular as an ISP (Internet Service Provider) to connect you to the Internet.

Steps of a connection:

1. When your Raven is powered on, it automatically searches for cellular service using EDGE/GPRS.
2. Your Raven establishes a PPP (Point to Point Protocol or "dial" up connection) link to Cingular's network, also called registering on the network, and receives an IP address.
3. When your Raven has received its IP address from Cingular, then it is ready to allow you to connect to the Internet.

FIGURE 2. Using the Raven to connect to the Internet

Dynamic vs. Static IP Addresses

As stated above, when your Raven registers on Cingular's network, it receives an IP address. There are two types of addresses on networks: dynamic and static.

- Dynamic addresses are assigned on a "need to have" basis. Your Raven might not always receive the same address each time it connects with Cingular.
- Static addresses are permanently assigned to a particular account and will always be used whenever your Raven connects to the Internet. The IP address will not be given to anyone else.

Most ISPs (cellular included) use dynamic IP addresses rather than static IP addresses since it allows them to reuse a smaller number of IP addresses for a large number of customers. A dynamic IP address is suitable for many common Internet uses, such as web browsing, looking up data on another computer system, or other client functions (such as data only being sent out or only being received after an initial request).

If you need to contact your Raven, a device connected to the modem, or a host system using the modem from the Internet, you need to have a known IP (such as one which is static) or domain name (an IP address which is converted by a DNS server into a word based name). If you have a dynamic IP address for your modem, you can use a Dynamic DNS service (such as IP Manager, page 14) to translate your IP address into to a domain name.

Caution: If you want to connect remotely to your Raven using TCP/IP, the IP address given to your modem by the network cannot be a private or internal IP address (such as a custom APNData Link) unless you are on the same network or inside that network's firewall (such as with frame relay).

Using Your Raven to Connect to the Internet

In Public Mode, your Raven will pass the IP address from Cingular's network to your device or computer. In Private Mode, your modem will assign configured, static local network IP addresses for the modem and your device.

The modem will perform a **one-to-one** routing for all internet traffic to and from the computer or other end device.

If you need to have more than one device connected to the Internet through the modem, you will need to have a router connected to the modem. The modem would provide the one-to-one connection to the router with the router configured to provide a broader NAT service to the other devices connected to it.

To use your Raven's serial port to connect to the Internet from your computer, you need to connect the computer directly to the Raven's serial port with a straight-through serial cable and use Dial-Up Networking (DUN).

Common Uses for the Raven

The Raven's rugged construction and cellular connection make it ideal for use in remote and/or industrial locations.

The Raven can be used for telemetry and for more advanced communication to the device or devices behind it.

FIGURE 3. Backup connection to the Internet

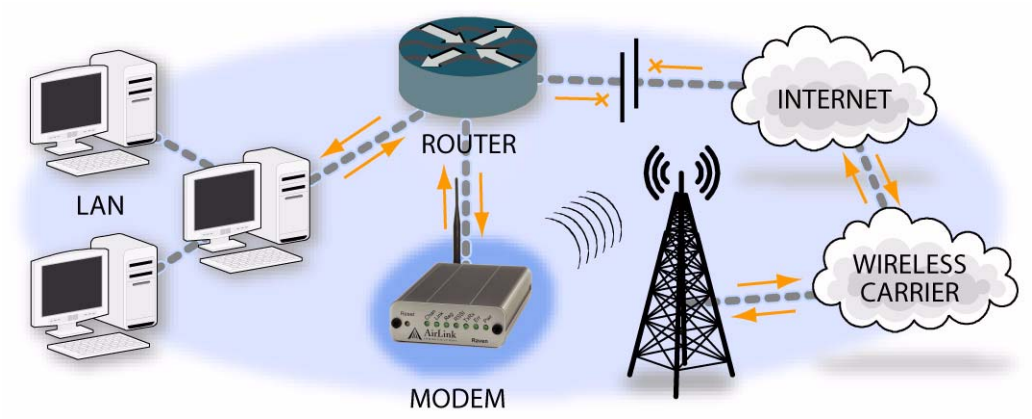


FIGURE 4. Financial Point of Sale and Kiosk

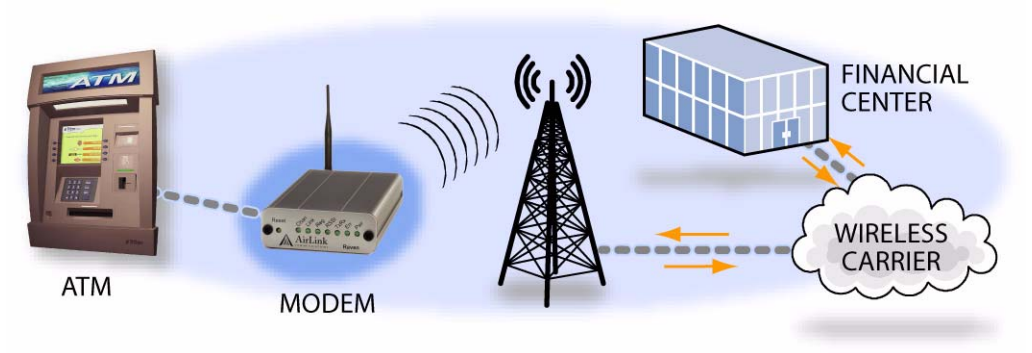
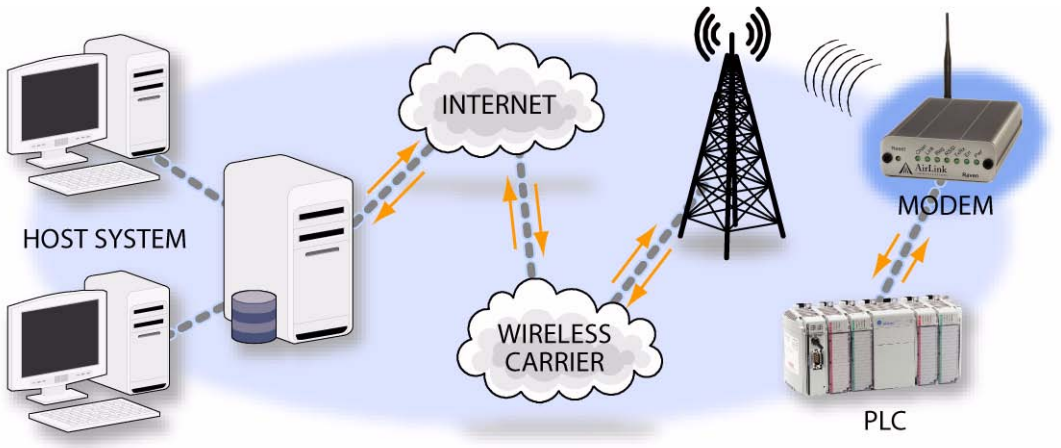


FIGURE 5. Automation and Telemetry



CHAPTER 2

Activation of the Raven

To install the SIM, you will only need a small phillips head screw driver.

1. Opening the Case

a. Unplug the Raven's power and all cables.

b. Using a small phillips head screw driver, remove the screws on the back of the Raven.

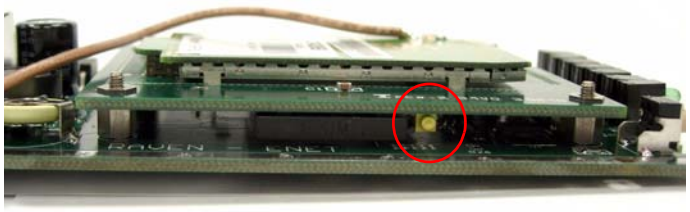
c. Slide the casing off of the Raven and set it aside.

FIGURE 1. Raven back

2. Ejecting the SIM tray

a. Using the tip of a PDA stylus, an unbent paperclip, or other slim *blunt* item press the yellow button of the SIM tray. On the Raven, the button is between two boards.

FIGURE 2. Tray button: Raven



b. Slide the tray out of the slot.

FIGURE 3. **Empty SIM Tray**

3. Inserting the SIM

a. Place the SIM into the tray and gently press to click it into place.

FIGURE 4. **SIM Tray with a SIM**

The SIM may be a different color than this example.

b. Slide the tray back into the modem and gently press to click it into place.

FIGURE 5. **Inserting the SIM: Raven**

4. Finishing the SIM installation

a. Slide the Raven back into the case.

b. Secure the back of the Raven with the screws.

Setting the APN with Wireless Ace

The APN (Access Point Name) is the way your modem knows how it will be communicating with the network. The APN allows custom IP addressing and tailoring your company's wireless IP solution to meet the security and IP addressing requirements of your applications.

Most Cingular accounts use the default addressing solution of Private or Public IP addresses supplied by the Internet and Proxy APNs. Only if you have a Static or Custom IP address should you need to configure a custom APNs.

To configure the APN, you need to use Wireless Ace. If you haven't installed Wireless Ace refer to the "software required" section on page 1 of this guide.

1. Powere on your Raven and connect directly to the serial port on your computer.

2. Start **Wireless Ace** and connect to your modem.

Start > All Programs > AirLink Communications > Wireless Ace 3G > Wireless Ace 3G

A. Click on **Connect**.

B. Select **PPP**.

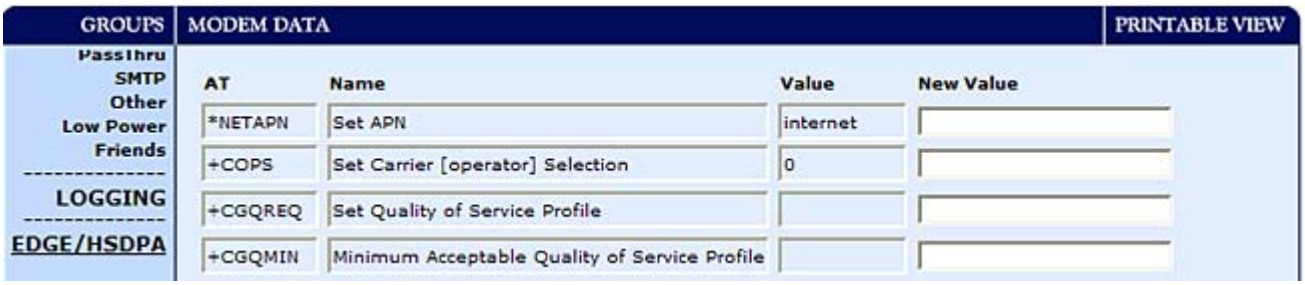
C. Select the COM port to which the modem is connected on your computer (commonly ***COM1***).

D. Type in the modem's password (default ***12345***).

FIGURE 6. Wireless Ace: Connect

3. Select **EDGE/HSDPA** from the menu on the left side of Wireless Ace (under "Groups").

FIGURE 7. Wireless Ace: EDGE/HSDPA



4. Type in the APN in the new value field of *NETAPN.

FIGURE 8. Wireless Ace: *NETAPN

For most Cingular accounts the APN for your modem will be **Internet** or **Proxy**. Consult with your account representative on which APN to use.

If you need to configure your modem for a custom APN, after entering the APN, there is additional information you will need to enter.

A. Select **Misc** from the menu on the left side under the Common group.

FIGURE 9. Wireless Ace: Common - Misc

B. Enter the **NAI** into the new value field for ***NETUID** and enter your **network password** into the new value field for ***NETPW**.

FIGURE 10. Wireless Ace: Common - Misc

5. When you have finished entering the APN settings, click the **Write** button on the tool bar of Wireless Ace and wait for the message “Write Successful” to appear in the status bar.

FIGURE 11. Wireless Ace: Write

6. It is recommended that you reset your modem after configuring the APN. Either click the Reset button in Wireless Ace or press the reset button on the modem.

CHAPTER 3

Utilities for the Raven

AirLink offers a suite of utilities to optimize your Raven's performance, allowing you to remotely view status and make changes to the configuration as needed.

- AceView
- Wireless Ace
- AceNet
- Modem Doctor

This section of the Raven User Guide covers basic information about these utilities. For additional information on a specific application and how to use it, please refer to the user guide for the specific utility.

AirLink modem utilities, except AceNet, are free of charge to those who own AirLink modems. You can download the applications and their user guides from the AirLink web site: http://www.airlink.com/support. Contact your dealer or AirLink representative for information on AceNet.

Note: AceView, Wireless Ace, and AceNet require the Microsoft .NET Framework v. 1.1 and Microsoft Windows 98, Windows 2000, Windows XP, or later. You can obtain the Microsoft .NET Framework from Microsoft at: http://www.microsoft.com/.

AceView

AceView is a low-profile monitoring tool to view the status of your AirLink Raven and display network status, IP address, RSSI strength, and other basic connection information.

FIGURE 1. AceView

You can connect to your Raven locally using a DUN connection . The display is dynamically updated with the current status of the modem. *The GPS features are available only for PinPoint X, PinPoint-E, and PinPoint modems.*

When you use DUN to connect to your Raven, AceView can monitor and maintain the DUN connection. *The DUN connection features are not available with Windows NT or Windows 98. Refer to the AceView Guide for information on how to connect using serial for Windows NT or Windows 98.*

Wireless Ace

Wireless Ace enables modems equipped with ALEOS to be monitored and configured locally or remotely.

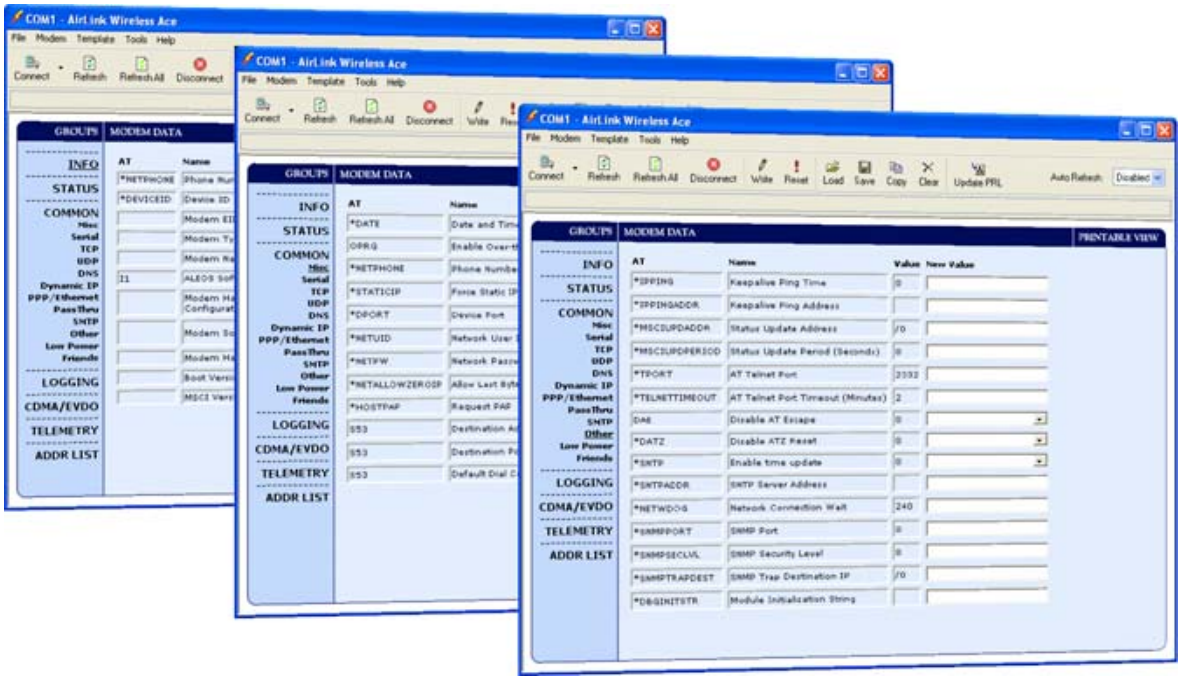
As long as your Raven is online and publicly accessible, support personnel can access your modem from anywhere at any time to see how it is operating and how it is configured. Parameter changes can be made instantly over-the-air.

Once your modem is configured and installed correctly, a template can be made to program other modems with the same parameter values. This enables quick, accurate deployment of large pools of modems.

Most configuration screen shots in this guide are using Wireless Ace.

Connecting to the modem using Wireless Ace is covered in the “AT Commands” chapter on page 50.

FIGURE 2. Wireless Ace



AceNet

AceNet is a full featured application that you can use to monitor several AirLink modems at the same time, use a template from Wireless Ace to change the configuration in all of them simultaneously, keep the modems up-to-date with the latest firmware by updating them over the air, periodically log the modems' Status parameters, and even graphically chart the logged parameters to see trends or other over time information.

AceNet's remote connections use TCP/IP, UDP, or SMS.

AceNet is a separate product which can be purchased from AirLink. Contact your AirLink representative for more information.

FIGURE 3. AceNet

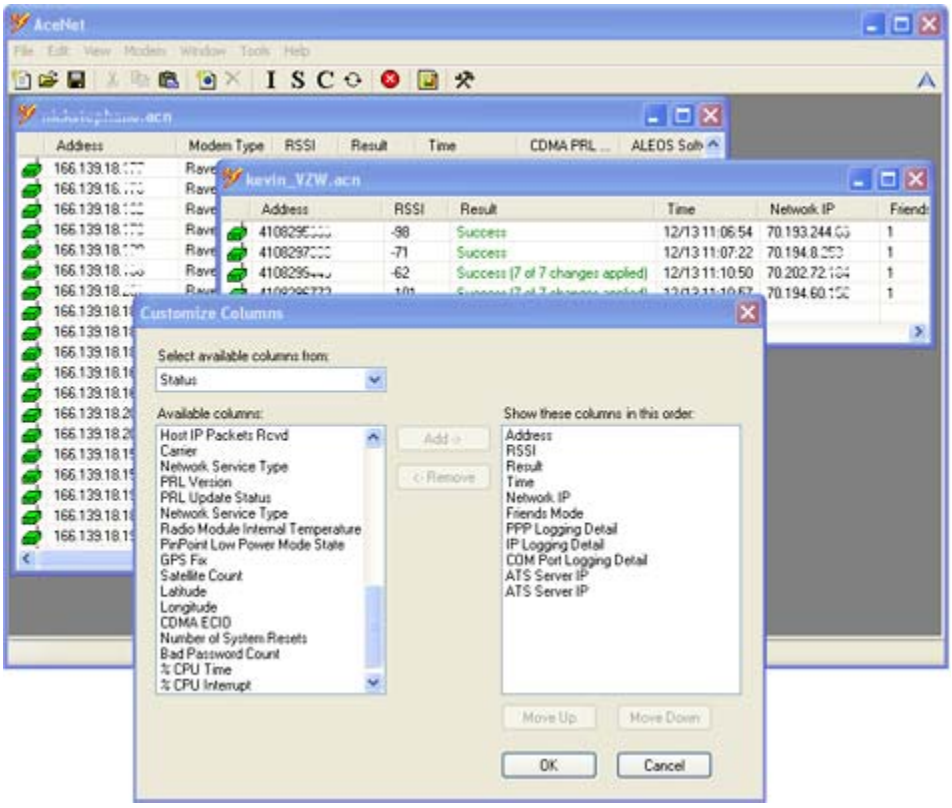
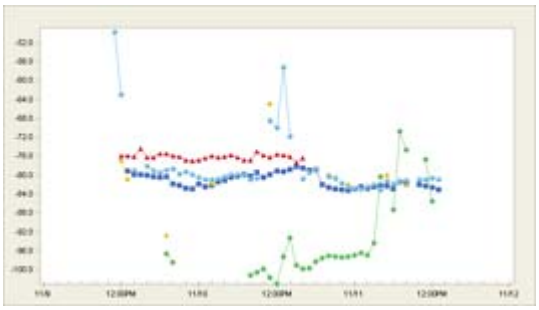


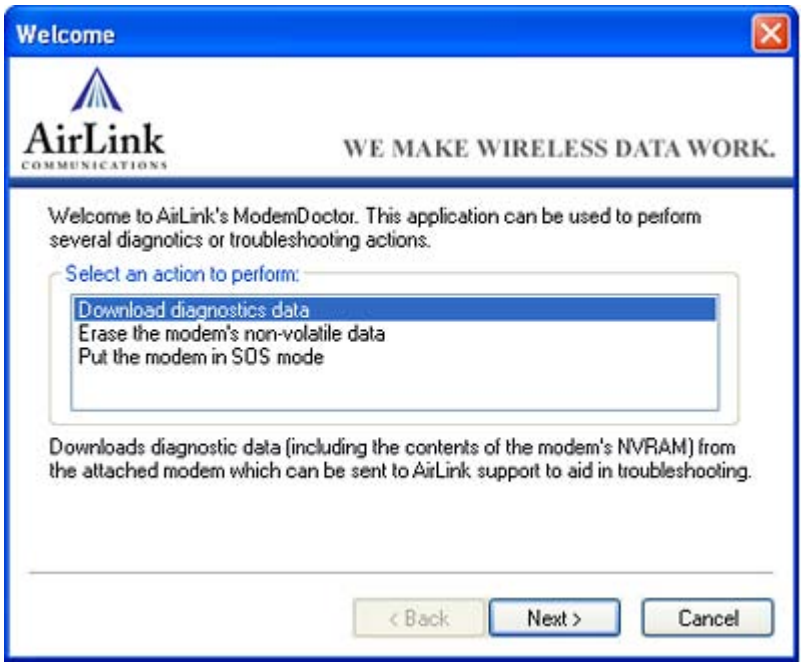
FIGURE 4. AceNet Charting



Modem Doctor

Modem Doctor is a troubleshooting and diagnostics utility. This utility will allow you to get a log file of the Raven activity which you can then send to AirLink support, erase the current configuration completely, and temporarily set the Raven to a known configuration to aid in trouble shooting (SOS mode).

FIGURE 5. Modem Doctor


Welcome
AirLink
COMMUNICATIONS
WE MAKE WIRELESS DATA WORK.
Welcome to AirLink's ModemDoctor. This application can be used to perform several diagnotics or troubleshooting actions.
Select an action to perform:
Download diagnostics data
Erase the modem's non-volatile data
Put the modem in SOS mode
Downloads diagnostic data (including the contents of the modem's NVRAM) from the attached modem which can be sent to AirLink support to aid in troubleshooting.
< Back
Next >
Cancel

CHAPTER 4

IP Manager and DNS

If you have a fleet of AirLink modems or even if you only have one, it can be difficult to keep track of the current IP addresses, especially if the addresses aren't static but change every time the modem connects to Cingular. If you need to connect to the modem, or the device behind it, it is so much easier to connect when you have a name (car54.mydomain.com, where are you?).

Reasons to contact the modem and/or the connected device:

- Requesting a location update from a delivery truck.
- Contacting a surveillance camera to survey the area.
- Remote access to a computer.
- An oil derek that needs to be triggered to begin pumping.
- Sending text to be displayed by a road sign.
- Monitoring the status of a remote modem.

Domain names, though, are often only connected to static IP addresses because of the way most domain name (DNS) servers are set-up. Dynamic DNS servers require notification of IP Address changes so they can update their DNS records and link a dynamic IP address to the correct name.

Since many cellular providers, like wire-based ISPs, do not offer static IP addresses or static address accounts cost a premium vs. dynamic accounts, IP Manager was developed to work with a Dynamic DNS server to receive notification from AirLink modems to translate the modem's dynamic IP address to a fully qualified domain name. Thus, you can contact your Raven directly from the Internet using a domain name.

- Dynamic IP addresses are granted only when your Raven is connected and can change each time the modem reconnects to the network.
- Static IP addresses are granted the same address every time your Raven is connected and are not in use when your Raven is not connected.

A dynamic IP address is suitable for many Internet activities such as web browsing, looking up data on another computer system, data only being sent out, or data only being received after an initial request. However, if you need to contact your Raven directly, a device connected to the modem, or a host system using your Raven, a dynamic IP won't give you a reliable address to contact (since it may have changed since the last time it was assigned).

Fully Qualified Domain Name

A domain name is a name of a server or device on the Internet which is associated with an IP address. Similar to how the street address of your house is one way to contact you and your phone number is another, both the IP address and the domain name can be used to contact a server or device on the Internet. While contacting you at your house address or with your phone number employ different methods, using a domain name instead of the IP address actually uses the same method, just a word based name is commonly easier to remember for most people than a string of numbers.

Understanding the parts of a domain name can help to understand how IP Manager works and what you need to be able to configure the modem. A fully qualified domain name (FQDN) generally has several parts.

- **Top Level Domain (TLD):** The TLD is the ending suffix for a domain name (.com, .net, .org, etc.)
- **Country Code Top Level Domain (ccTLD):** This suffix is often used after the TLD for most countries *except the US* (.ca, .uk, .au, etc.)
- **Domain name:** This is the name registered with ICANN (Internet Corporation for Assigned Names and Numbers) or the registry for a the country of the ccTLD (i.e. if a domain is part of the .ca TLD, it would be registered with the Canadian domain registry). It is necessary to have a name registered before it can be used.
- **Sub-domain or server name:** A domain name can have many sub-domain or server names associated with it. Sub-domains need to be registered with the domain, but do not need to be registered with ICANN or any other registry. It is the responsibility of a domain to keep track of its own subs.

car54.mydomain.com

- **.com** is the TLD
- **mydomain** is the domain (usually noted as mydomain.com since the domain is specific to the TLD)
- **car54** is the subdomain or server name associated with the device, computer, or modem registered with mydomain.com

car54.mydomain.com.ca

This would be the same as above, but with the addition of the country code. In this example, the country code (.ca) is for Canada.

A URL (Universal Resource Locator) is different from a domain name in that it also indicates information on the protocol used by a web browser to contact that address, such as http://www.airlink.com. www.airlink.com is a fully qualified domain name, but the http://, the protocol identifier, is what makes the whole thing a URL.

Dynamic Names

When an IP address is not expected to change, the DNS server can indicate to all queries that the address can be cached and not looked up for a long period of time. Dynamic DNS servers, conversely, have a short caching period for the domain information to prevent other Internet sites or queries from using the old information. Since the IP address of a modem with a dynamic account can change frequently, if the old information was used (such as with a DNS server which indicates the address can be cached for a long period of time) when the IP address changed, the domain would no longer point to the new and correct IP address of the modem.

If your Raven is configured for Dynamic IP, when it first connects to the Internet, it sends a IP change notification to IP Manager. IP Manger will acknowledge the change and update the Dynamic DNS server. The new IP address will then be the address for your Raven's configured name.

Once your Raven's IP address has been updated in IP Manager, it can be contacted via name. If the IP address is needed, you can use the domain name to determine the IP address.

Note: The fully qualified domain name of your Raven will be a subdomain of the domain used by the IP Manager server.

Configuring the Raven for Dynamic IP

To configure the Dynamic IP settings in your Raven so that it will use IP Manager, you can use Wireless Ace or a terminal application to enter the commands (page 50).

To configure your AirLink modem to be addressed by name, the modem needs to have 4 elements configured. You can configure a second dynamic server as a backup, secondary, or alternate server. In Wireless Ace, select **Dynamic IP**.

FIGURE 1. Wireless Ace: Dynamic IP

***MODEMNAME:** The name you want for the modem.

***DOMAIN:** The domain name to be used by the modem.

***IPMANAGER1** and ***IPMANAGER2:** The IP address or domain name of the dynamic DNS server which is running IP Manager.

Note: To use the name here instead of the IP, you need to have DNS set up in your Raven (page 17).

***IPMGRUPDATE1** and ***IPMGRUPDATE2:** How often, in minutes, you want the address sent to IP Manager. If this is set to zero, the modem will only send an update if the IP address changes (example, if your Raven modem is reset or is assigned a different IP address).

***IPMGRKEY1** and ***IPMGRKEY2**: User defined password key which is used instead of AirLink secret key.

Restrictions for Modem Name

For the Modem Name, you should use something which is unique but also easy to remember. Your company name or the intended function of the modem are recommended. If you have more than one modem and want to name them the same, you can append a number for each. Since it is an Internet domain name, there are some restrictions for the name.

- Must begin with a letter or number
- Can include a hyphen (-)
- Cannot contain spaces
- Must be no longer than 20 characters total

Eairlink.com

As a service, Airlink maintains a IP Manager servers which can be used for any AirLink modem.

- *DOMAIN: eairlink.com
- *IPMANAGER1 : edns2.eairlink.com
- *IPMANAGER2 : eairlink.com

Note: The IP Manager service from AirLink is currently not a guaranteed service though every effort is made to keep it operational 24/7.
When using AirLink's IP Manager servers, since there are many AirLink modems using the service, it is even more imperative to have a unique name for your modem.

DNS: Using Names Instead of IP addresses

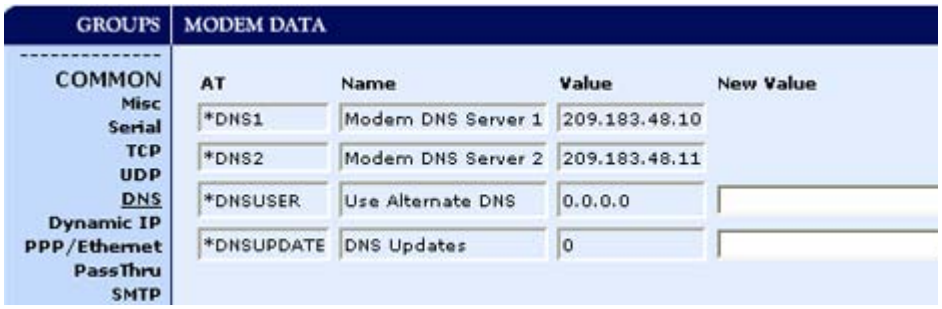
The Raven has the ability to query DNS servers in order to translate domain names into IP addresses. This allows you to use domain names in place of IP addresses for most of the configuration options requiring IP addresses. This is important if your Raven will need to contact another modem or other device that has a domain name but an unknown or dynamic IP address (such as another remote Raven using IP Manager).

Configuring DNS

Generally, when your Raven receives its IP address from Cingular, it will also receive Cingular's DNS servers to use for resolving (or translating) names to IP addresses which it will automatically configure in the modem settings. Unless your Raven will be used on a network with other modems or devices which have names internal to the local network or frequently changing IP addresses, the DNS servers provided by Cingular should be all you need.

If the Raven will be communicating with a device that has a domain name but changes its IP address frequently (such as another AirLink modem using IP Manager) or is on a network where devices are accessed by names rather than IP addresses, you will want to put in an alternate DNS (*DNSUSER) where that domain is updated, such as the IP Manager server the remote modem is using or the listing of IP addresses to names is kept.

FIGURE 2. Wireless Ace: DNS



***DNS1** and ***DNS2** - The primary and secondary DNS servers set by Cingular when your Raven gets its IP address.

***DNSUSER** - Set this, if desired, to an additional DNS server to query first before the primary or secondary (just as a hosts file is queried first on a computer). If *DNSUSER is set to 0.0.0.0, it will be ignored.

***DNSUPDATE** - This command sets how often you want DNS Updates to be requested. Otherwise the Raven will only send updates when it is reset, powered up, or the IP address is granted by network changes.

Note: If you will be using your Raven to communicate with another AirLink modem and both are using IP Manager to translate dynamic IP addresses to domain names, it is recommended that you set ***DNSUSER** to the IP address for IP Manager. IP Manager's updates occur more frequently than Cingular's DNS servers decreasing the time between IP address change and address resolution. Likewise, if your Raven routinely needs to contact another modem or device with a Dynamic DNS domain and that modem or device frequently changes its IP address, you may need to set ***DNSUPDATE** for frequent updates.

PPP-Peer

The Raven uses the unqualified domain name of "ppp-peer" when it is in PPP or SLIP address mode to resolve the address of the device or computer connected via PPP or SLIP address. If the Raven is not in PPP or SLIP address mode, "ppp-peer" will resolve to 0.0.0.0.

CHAPTER 5

Data Communication and Host Modes

The Raven plays the part of a HOST when a computer or another device is connected to its serial port. The Raven can also route data to/from the connected device to the cellular network.

Note: The Raven moves data from one port to the cellular network in a simple **one-to-one** routing. It does not employ a routing table or any complicated routing protocol. If you need to have one-to-many routing, you can connect the Raven to a router. The router would provide the multiple routing and the Raven would provide one-to-one for the router to the cellular network and the Internet.

As the host, the Raven can use different communication modes.

AT: The Raven accepts and responds to standard AT commands.

PassThru: Direct connection to internal hardware (OEM Module) of the Raven.

Telnet: The Raven auto-answers TCP connections to allow terminal emulation using the cellular connection.

PPP: The Raven uses PPP to communicate with a device or computer connected to the serial port.

SLIP: The Raven uses SLIP to communicate with a device or computer connected to the serial port.

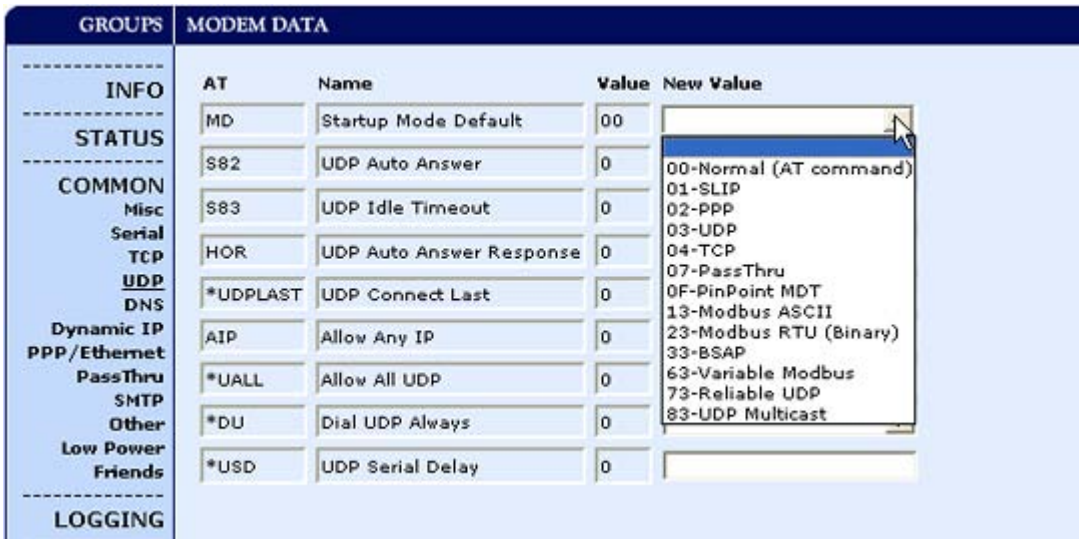
UDP and **UDP PAD:** Any data received on the serial port is assembled into UDP packets and sent to the session's associated IP address and Port (described later). Any responses received from the associated IP address and port destined for the modem's Device Port are unwrapped and sent out the serial port.

TCP and **TCP PAD:** Any data received on the serial port is packaged into TCP messages and sent to the associated connection's IP address and Port (described later). Any data received from the TCP peer is unwrapped and sent out the serial port.

By default, the Raven is in AT Mode and allows AT Commands to be entered via terminal connection (through the local port connection) or remotely (through the cellular network). PassThru Mode can only be exited by resetting the Raven. All other modes are entered by use of a startup mode command.

The serial port of the Raven can be configured to enter any of the modes automatically on power up (in most cases, this is also after it has registered on the cellular network). This is done by setting the Startup Mode Default (refer to **MD** in the AT Command listing, page 87) to the desired mode. If this setting is non-zero, the modem will enter the specified mode after 5 seconds. If you want to cancel this behavior, the **ATMD0** command can be used before the 5-second time-out expires.

FIGURE 1. Wireless Ace: MD



If the Raven is in any mode other than AT or PassThru, the AT command mode can be re-entered by:

- Deactivating DTR (if &D2 or Ignore DTR, S211, is not set).
- Issuing the +++ escape sequence (if Disable AT Escape, DAE, is not set).
- Resetting or Power cycling the modem.

Note: DTR needs to be asserted (S211=1 or &D0) by the host before PPP Mode, SLIP Mode, UDP PAD Mode, or TCP PAD Mode can be entered.

AT Mode

Using a terminal connection, AT commands are used to configure the modem, command it to do something, or query a setting. For a full listing of the AT commands, refer to page 50. Wireless Ace is a graphical user interface for most AT Commands.

AT commands must always be terminated by <CR> (ASCII character 0x0D), a carriage return (pressing enter on the keyboard). Some may also include a new line or line feed <LF>.

If **E=1** (Echo On), the AT command (including the terminating <carriage return) will be displayed (output) before any responses.

Two settings affect the format of AT command output: V (Verbose) and Q (Quiet).

If **Q=1** (Quiet On), no result codes are output whatsoever, so there is no response generated by a (non query) command.

If **Q=0** (Quiet Off), result codes are output. The format of this output is then affected by the Verbose setting.

If Quiet mode is off, the result code is affected as follows:

For **V=1** (Verbose mode), the textual result code is surrounded by a carriage return and new line. Any AT query response is also surrounded by a carriage return and new line.

For **V=0** (Terse mode), a numeric result code is output with a single trailing carriage return (no new line is output), while any AT query response is followed by a carriage return and new line (there is no preceding output).

For example, possible output to the AT command "AT" with carriage return (assuming quiet mode is not on) is:

carriage return - if V=0

carriage return and new line OK another carriage return and new line - if V=1

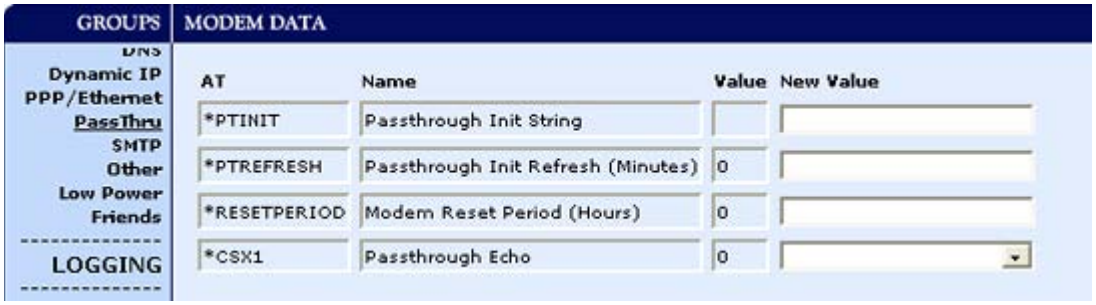
PassThru Mode

In PassThru mode, the Raven does not behave normally, all port communication is passed directly between the internal hardware and the computer connected directly to the modem. This mode can be used to configure hardware-specific settings (for example, provisioning, troubleshooting, communicating with legacy equipment, etc.).

Issuing the "**AT\APASSTHRU**" from a terminal emulation enters this mode. The modem responds with **OK**, at which point a direct connection to the internal hardware is established.

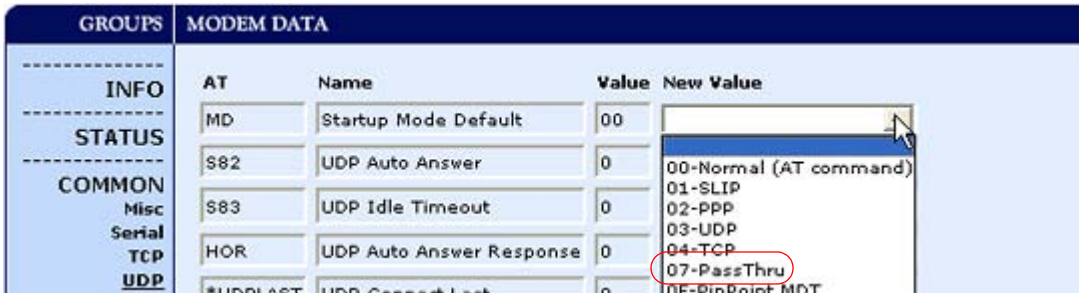
With Wireless Ace, you can configure a string of AT commands to be sent to the Raven when it enters PassThru and other PassThru settings.

FIGURE 2. Wireless Ace: PassThru



You can configure MD to have the Raven enter PassThru on start up.

FIGURE 3. Wireless Ace: MD



Some internal hardware requires upwards of 20 seconds before AT commands can be entered, so be patient if there seems to be no response to AT commands.

Caution: PassThru can only be exited by resetting or power-cycling the modem. This mode cannot be entered via a remote Telnet session.

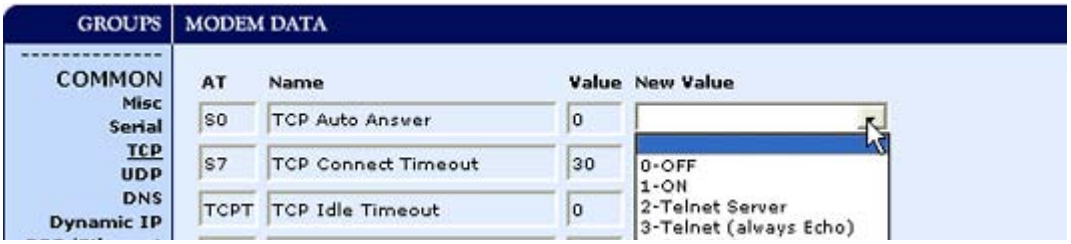
PassThru Mode allows only specific AT commands. Some ALEOS commands will be unavailable when the modem is in PassThru mode. The commands usable also depend heavily on the modem model number (found on the label on the top of the modem).

Caution: ALEOS is disabled in PassThru Mode. You cannot use most ALEOS specific commands while the modem is in PassThru Mode. While in PassThru mode, you also cannot use Wireless Ace to connect with the Raven.

Telnet

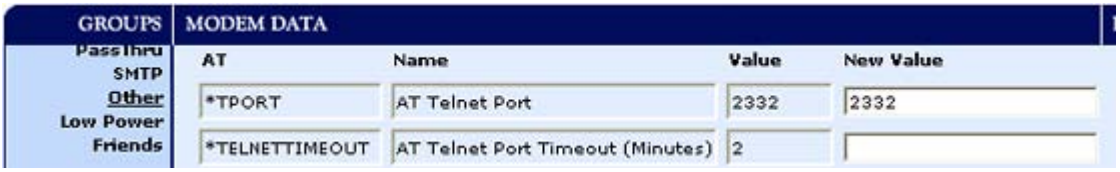
In Wireless Ace you can configure Telnet operation.

FIGURE 4. Wireless Ace: Telnet Configuration



If you need to change the port for Telnet (for example, you have the default port blocked on your firewall), the option is on the Other tab. The default telnet port is **2332**. You can also change the Telnet timeout, if the connection is idle, default 2 minutes.

FIGURE 5. Wireless Ace: Telnet Configuration



PPP

In PPP mode, the Raven acts as a PPP server, providing an IP address, and DNS servers (if available) to the Host.

PPP mode is entered from the AT mode by using any of the following commands:

AT\APPP

ATDT10.0.0.1

ATDT10001

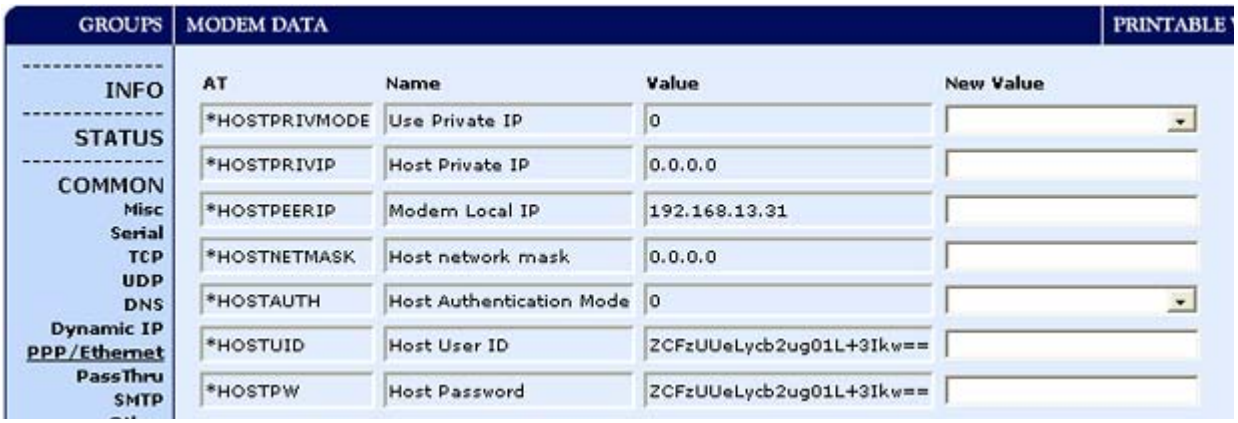
ATD*99*1#**

CLIENT

In response to any of the preceding commands, the modem will respond with **CONNECT** a carriage return and new line and is ready for the host to begin PPP negotiations.

The IP received by the host in the resulting negotiation will either be a private (non-routable) IP address or a public (network-routable) IP address provided by the network, depending on the settings of ***HOSTPRIVMODE**. If ***HOSTPRIVMODE=1**, the value of the private IP address can be determined beforehand by querying **S110**. The private IP address to be used can be defined with the command **AT*HOSTPRIVIP=192.168.100.33** substituting the desired IP address.

FIGURE 6. Wireless Ace: PPP/Ethernet



Using a private IP insulates the PPP client from changes in IP addresses of the underlying network. The will perform basic NAT-like address translation on all packets.

If a public IP address is being used, any changes in the IP (as determined by the wireless network) will result in the PPP link to the host being disconnected, requiring the host to reinitiate it. The public IP is passed to the host in the PPP negotiations, so when the network forces a change, the modem has to force the host to renegotiate the PPP link to make this happen.

Slip

SLIP mode is entered be using the "**AT\ASLIP**" command. As in PPP Mode, the IP address that the host assumes is affected by the setting of ***HOSTPRIVMODE**. SLIP does not negotiate the IP with the host, so before making a SLIP connection, the host SLIP driver must be configured to use the IP specified by querying S110.

UDP Pad

When the modem is in UDP PAD (Packet Assembly and Disassembly) Mode, all characters received on the seial port are assembled into UDP packets and sent to the Raven's remote IP address/port, and any packets received from the same IP/port-destined for the Raven's device port (see *DPORT)--are disassembled and dumped onto the serial line.

A UDP session is initiated by one of the following events:

- Using the Dial UDP (DP) AT command (example, **ATDP192.168.3.23/3456**).
- Setting the Startup Mode Default (**MD**) to 3 (UDP) so that a UDP session is entered automatically when the modem registers onto the network. Serial data will be sent to the IP/port specified in **S53**.
- Incoming UDP packets will be processed out the serial port if
  - UDP auto answer is enabled (**S82=2**);
  - The destination IP address matches that in **S53** (if Friends Mode is enabled, the IP address also needs to be present on the Friends List);
  - Or allow any IP is set (**AIP=1**);
  - The modem is in AT mode (not in a current UDP or TCP session).

UDP packet assembly is affected by the values of **S50** (PAD Forwarding Time-out) and **S51** (PAD Forwarding Character). Data received in the serial buffer will be transmitted when the idle inter-character time-out specified in **S50** (in tenths of seconds) occurs or when a character is received that matches **S51** (if non-zero).

UDP Auto Answer

UDP auto answer (previously called UDP half-open) is set with S82=2. When set, the Raven will automatically establish a UDP session to the source IP address and port of the UDP packet received. The Raven will remain "locked" to this one remote IP/port until no data is sent or received for the time interval defined in the UDP auto answer time-out (S83). During this session, packets from other IP/port addresses will be rejected, unless *UALL is set. Whether or not an incoming packet will cause the modem to enter a UDP session is always dependent on the S53 and AIP settings.

When idle, after the time-out has occurred, the is in AT command mode on the serial port, and any valid AT command may be entered during this time.

The Normal UDP Mode (**MD3**) can be combined with UDP auto answer to cause the incoming serial data to be sent in UDP packets (instead of being treated as AT commands), while allowing sessions to be established from different UDP sources. A UDP session will be initiated either by incoming serial data or by an incoming UDP packet. The session, started by either method, will be terminated when no data has been sent or received for the **S82** period. Once the session terminates, another may be initiated by either means.

Note: It is best to ensure the idle time-outs for TCP and UDP are never **0** if you're going to be using auto-answer, or either PAD mode. In those circumstances, you will want the modem to close the socket if the connection goes idle for too long, particularly if the other side doesn't normally close the connection.

When the session is initiated by serial data, the new session will be established using the destination address specified in **S53**. The **S53** setting can be changed if the connect to last UDP setting (***UDPLAST=1**) is set. The address in **S53** will be updated to reflect the address of the last session initiated by an incoming UDP packet. So that when new data is received over the host serial port while in the idle state, a session will be re-established with the last address. (This behavior is the same as the previous Hybrid2 (**MD6**) mode).

Note: TCP auto answer (**S0**) may also be set simultaneously with UDP auto answer. Then, when in the idle state, the modem will accept either a TCP or UDP incoming packet, and enter a TCP or UDP session as appropriate.

Reliable UDP

Reliable UDP adds a simple protocol on top of UDP to provide reliable delivery of data. When data is received from the host serial port, a 2 byte header is added to the data, containing a message type and a sequence number. The Raven will continue to send this data (buffering any received data in the meantime) until it receives an acknowledgement with this sequence number. If an acknowledgement is not received within the time-out period (specified in S7), the data will be retransmitted. This will continue until an acknowledgement is received or the modem is reset. Likewise any UDP packets received by the Raven are expected to have this simple header. The Raven will issue an acknowledgement for any valid packets which are received.

To configure the Raven for a normal UDP session, you need to set the Startup Mode Default to 73 (**ATMD73**). If you are using two modems, configure the Destination IP and Port in each to point to each other. Serial data will then be sent reliably between the two.

Note: Although it adds reliability, the simple implementation of the Reliable UDP mode in the does not check for duplicate packets.

UDP Multicast Mode

UDP Multicast mode results in any data received from the host serial port being sent to all the clients in the address list. The remote port number is taken from S53. To avoid flooding the network, the packets are sent to each client with a 20ms pause in between. The receipt of UDP packets works as in normal UDP mode (i.e. bound by the value S53 and/or AIP). Since it may take a while to transmit the data to all hosts (especially if all 20 Modbus entries are used and name resolutions are required), new data received from the host port is buffered until current transmissions to all hosts are finished.

Enter the list of target IPs in the address list (**ADDR LIST**). The index numbers in the list aren't used. Configure for a normal UDP session. Set the Startup Mode Default to 83 (**ATMD83**). Configure the Destination port to match the device port of the remote modems.

TCP PAD

When the Raven is in a TCP session, all characters received on the serial port are assembled into TCP packets and sent to the mode's remote IP address/port, and any packets received from the remote end of the TCP connection are disassembled and dumped onto the serial line.

A TCP connection is established by one of the following methods:

- Using the Dial TCP (**DT**) AT command (for example, **ATDT192.168.3.23/3456**)
- TCP auto answer is enabled (**S1**), a TCP connection request is received, and the modem is not in a data session.
- Data is received on the serial port and
  - The Startup Mode Default (**MD**) is **4** (auto TCP)
  - The remote TCP destination, as defined in **S53**, successfully responds to the TCP connection request.

The value of **S7** (TCP Connection Time-out) specifies the number of seconds to wait, after initiating a TCP connection attempt, for a successful connection to be established. If the connection has not been successfully established before the time-out occurs, **ERROR/BUSY** is returned.

TCP packet assembly is affected by the values of **S50** (PAD Forwarding Time-out) and **S51** (PAD Forwarding Character). Data received in the serial buffer will be transmitted when the idle inter-character time-out specified in **S50** (in tenths of seconds) occurs or when a character is received that matches **S51** (if non-zero).

The TCP session will be terminated if no data is transmitted or received for the time interval specified in **TCPT** and **TCPS**. **TCPT** is the number of minutes (**TCPS=0**) or seconds (**TCPS=1**) used for this idle time-out.

Caution: TCPT should never be 0 when using the TCP mode. A broken TCP session can result in the modem being left with a TCP half-open connection that can only be terminated with a reset.

TCP Auto Answer

TCP auto answer (S0=1|2) also allows a TCP connection request to be "answered" when the modem is idle, not in a data session. The TCP connection request's destination port has to match the modem's device port.

Note: UDP auto answer may also be set simultaneously with TCP auto answer. Then, when in the idle state, the modem will accept either a TCP connection request or UDP incoming packet, and enter a TCP or UDP session as appropriate.

Hybrid Modes

Some previous hybrid modes (MD=5, 6) are no longer implemented as special, unique modes. Now that UDP auto answer (UDP Half-open, S82=2) can be enabled in conjunction with UDP PAD mode (MD3), effectively this is the same as MD5 and MD6 previously accomplished. Setting MD5 and MD6 are still supported, but not recommended.

TABLE 1. Hybrid Modes

AT	**Hybrid** (MD5)	**Hybrid2** (MD6)
MD	3	3
S82	2	2
S0	1	1
*UDPLAST	0	1

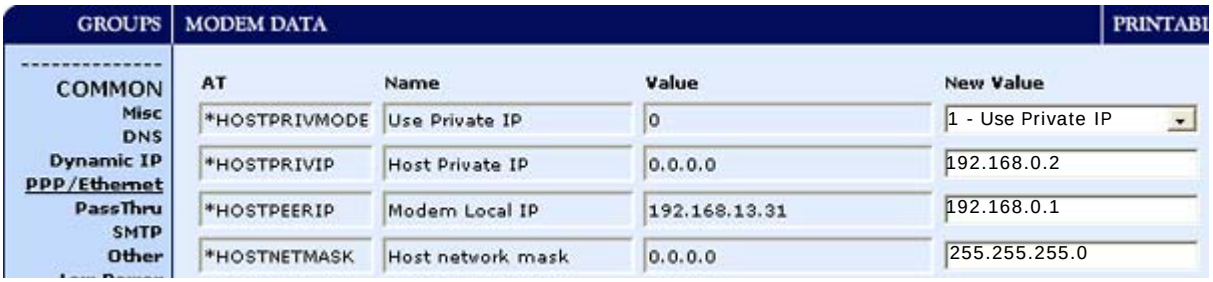
Public and Private Mode

By default, the Raven is in Public Mode and will pass the IP address assigned by the Cingular network to the device connected to its port. If you need more control over which gateway address, device address, and netmask that is given out by the DHCP server, you can use the private host mode, *HOSTPRIVMODE, and set the internal network IP addresses. The Raven will use NAT to forward packets to the end device.

Note: When using Public mode, connect the modem directly to the computer or other end device. Using a hub or switch may prevent the modem from updating the IP address of the end device when an IP address is received from the Cingular network.

In Wireless Ace, the Private mode settings are part of the **PPP/Ethernet** group.

FIGURE 7. Wireless Ace: Private Host Mode



- ***HOSTPRIVMODE** - Set to **1** to enable the explicit IP addresses.

- ***HOSTPRIVIP** - Set to the IP address you want the Raven to give to your device.
- ***HOSTPEERIP** - Set to the IP address you want for the Raven.
- ***HOSTNETMASK** - Set to the subnetmask (generally, 255.255.255.0).

Note: If you are using Private Mode (*HOSTPRIVMODE=1), you will need to make sure that *HOSTPRIVIP and *HOSTPEERIP are on the same subnet. If the subnet mask is 255.255.255.0, it is safe to use 192.168.*x*.*y* for each as long as the *x* is the same number (0 in the example screen shot above) and the *y* is different (1 and 2 in the example) and between 0 and 254. The screenshot shows an example.

Keepalive

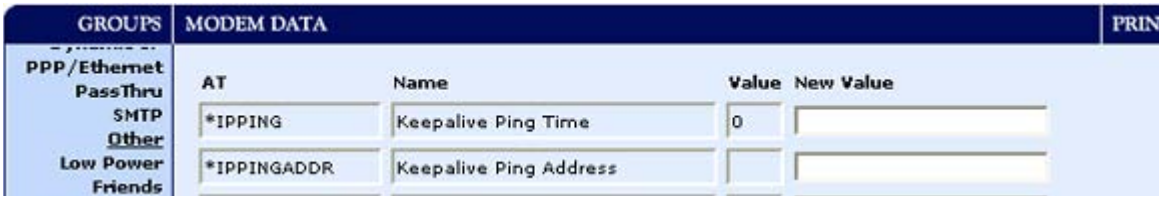
Keepalive is used to test the Raven's connection by pinging an IP address after a specified period of inactivity. Keepalive is only recommended for users who have a remote terminated modem that infrequently communicates to the network or if you have experienced issues over time where the modem can no longer be reached remotely.

When Keepalive pings the IP address, an acknowledgement indicates there is an active connection to the network. If the Raven does not receive a response from the IP address, it will make additional attempts according to a backoff algorithm before determining the Internet connection is not functioning properly. If it determines the connection is not fucntioning, the modem will then attempt to reconnect to Cingular to reestablish IP connectivity.

Configuring Keepalive

You can use Wireless Ace or a terminal connection to configure Keepalive (page 50). In Wireless Ace, select **Other** from the groups menu on the left.

FIGURE 8. Wireless Ace: Keepalive Configuration



***IPPING** sets the interval, in minutes, you want Keepalive to test the network connection. To disable Keepalive, set *IPPING to 0 (default setting).

Note: 15 minutes is the minimum time which can be set for Keepalive.

***IPPINGADDR** sets the IP address you want to use for the connection test.

Caution: If *IPPINGADDR is left blank or is set to an invalid IP address (example, an IP which is unreachable or one which is not a valid IP address), modem performance will be adversely affected.

Data usage using Keepalive

Keepalive is an optional feature. If you frequently pass data with your modem, you most likely do not need to have Keepalive enabled. When using Keepalive, be aware that a ping moves approximately 66 bytes of data over the network and is billable by the carrier. The following *IPPING settings will incur approximate monthly data usage in addition to any other data usage:

15 minutes	400k / month	60 minutes	100k / month
30 minutes	200k / month	120 minutes	50k / month

CHAPTER 6

Modbus/BSAP Configuration

The Raven supports Modbus ASCII, Modbus RTU, BSAP, and can also emulate other protocols like DF1 or others using its Modbus Variable feature.

Modbus Overview

The Modbus Protocol, developed by Modicon in 1979, provides for client-server (also referred to as master-slave) communications between intelligent devices. As a de facto standard, it is the most widely used network protocol in the industrial manufacturing environment to transfer discrete/analog I/O and register data between control devices.

Modbus, BSAP, and other Modbus variations are often used in conjunction with telemetry devices.

This section is just a brief overview of Modbus. For more information, refer to your Modbus equipment distributor or manufacturer or http://www.modbus.org.

Telemetry

Telemetry is an automated communications process by which data is collected from instruments located at remote or inaccessible points and transmitted to receiving equipment for measurement, monitoring, display, and recording. Transmission of the information may be over physical pairs of wires, telecommunication circuits, radios or satellite.

Remote Terminal Unit (RTU)

Modbus was originally designed to be used in a radio environment where packets are broadcast from a central station (also called master or host) to a group of remote units. Each remote unit, Remote Terminal Unit (RTU), has a hexidecimal identification number (ID). The first part of the broadcast packet contains an RTU ID which corresponds to the ID of one of the remote units. The Modbus host looks for the ID and sends to only the unit with the matching ID. The RTU would then reply back to the central station.

The RTU connects to physical equipment such as switches, pumps, and other devices and monitors and controls these devices. The RTU can be part of a network set up for Supervisory Control and Data Acquisition.

Supervisory Control and Data Acquisition (SCADA)

Supervisory Control and Data Acquisition (SCADA) describes solutions across a large variety of industries and is used in industrial and engineering applications to monitor and control distributed systems from a master location. SCADA encompasses multiple RTUs, a central control room with a host computer (or network), and some sort of communication infrastructure.

SCADA allows for "supervisory" control of remote devices as well as acquiring data from the remote locations. Programmable Logic Controllers allow for a higher degree of automated SCADA.

Programmable Logic Controller (PLC)

A Programmable Logic Controller (PLC) is a small industrial computer which generally monitors several connected sensor inputs and controls attached devices (motor starters, solenoids, pilot lights/displays, speed drives, valves, etc.) according to a user-created program stored in its memory. Containing inputs and outputs similar to an RTU, PLCs are frequently used for typical relay control, sophisticated motion control, process control, Distributed Control System and complex networking.

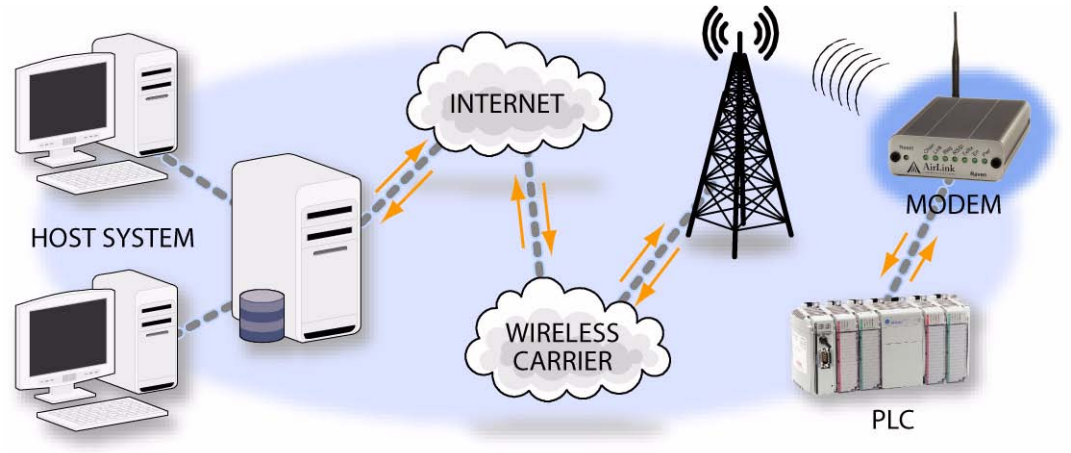
Modbus TCP/IP

Modbus TCP/IP simply takes the Modbus instruction set and wraps TCP/IP around it. Since TCP/IP is the communications standard for the Internet and most networked computers, this provides a simpler installation. Modbus TCP/IP uses standard Ethernet equipment.

Raven Modbus on UDP

When AirLink modems are used in place of radios, a Raven is connected to the central station (host) and a Raven is connected to each remote unit. When the Raven is configured for Modbus with UDP, the Raven connected to the host can store a list of IP addresses or names with matching IDs. When the host at the central station sends serial data as a poll request, the Raven at the host matches the RTU ID to a corresponding IP of a Raven at a remote unit. A UDP packet is assembled encapsulating the RTU ID and serial data transmitted from the host. The UDP packet is then transmitted to the specific Raven at the remote unit matching the RTU ID. The remote Raven then disassembles the packet before transmitting the RTU ID and serial data to the remote unit. The remote units operate in normal UDP mode and their data is sent to the host via the remote Raven and host modem.

FIGURE 1. Automation and Telemetry



Configuring the Raven

You can use either Wireless Ace, direct serial communication, or Telnet to configure your modem using AT commands (page 50).

Configuring the Raven at the Polling Host for Modbus on UDP

This section covers a Polling Host with standard Modbus, variations may need additional AT commands.

1. Configure the listening/device ports for the host and remotes.

The destination port for the modem at the host needs to match the device port in use on all the modems at the remote sites. For example, if the remote modem's device port (*see below*) is "12345", then the Modbus host modem's **S53** destination port should be set to "12345".

In Wireless Ace, select **Misc** in the side menu.

FIGURE 2. Wireless Ace: Destination Port

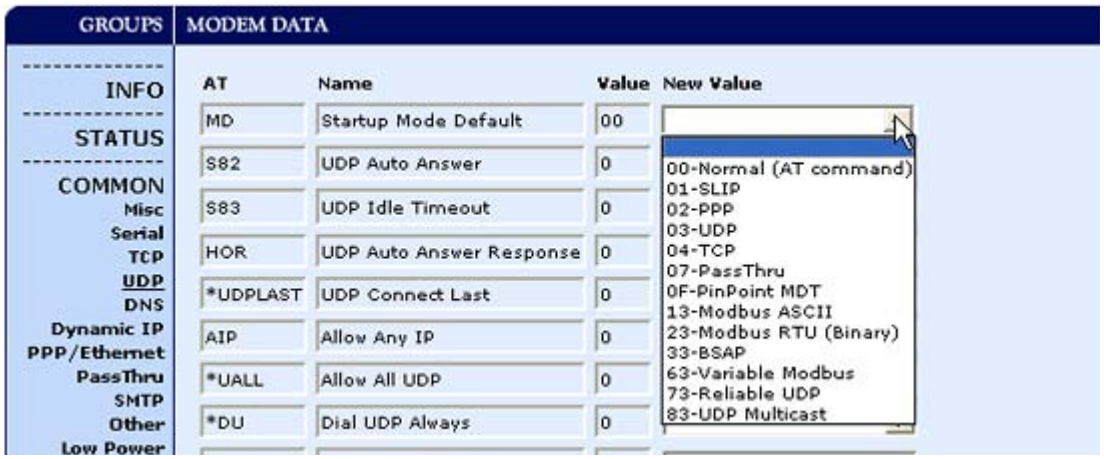
Take note of (or set) the Device Port setting in ***DPORT** to configure the remote modems.

FIGURE 3. Wireless Ace: Device Port

2. Configure the default mode for start-up.

The default start-up mode will need to be set. In Wireless Ace, select **UDP** in the side menu. Select the appropriate **MD** mode from the drop down menu.

FIGURE 4. Wireless Ace: MD Configuration



- **MD13**: Modbus ASCII
- **MD23**: Modbus RTU (Binary)
- **MD33**: BSAP
- **MD63**: Variable Modbus (individual parameters are set up manually)

3. Configure IP addresses for the Modbus IDs.

The last step of configuring the modem at the host is setting the IDs to their specific IPs. In Wireless Ace, select the menu option **Addr List**.

FIGURE 5. Wireless Ace: Addr List

Addresses can be entered in decimal or hex. Wireless Ace will translate hex entries into decimal. The number before the "=" is ID, the number after is the IP address. There can be a total of 100 remote ID/Local addresses entered into the modem.

When using AT commands via telnet or direct serial connection, use **ATMLIST** for decimal IDs and **ATMLISTX** for hexidecimal, ex. if the ID is 27 and the IP is 123.123.123.124, you would enter it as **ATMLIST27=123.123.123.124** or **ATMLISTX1B=123.123.123.124**.

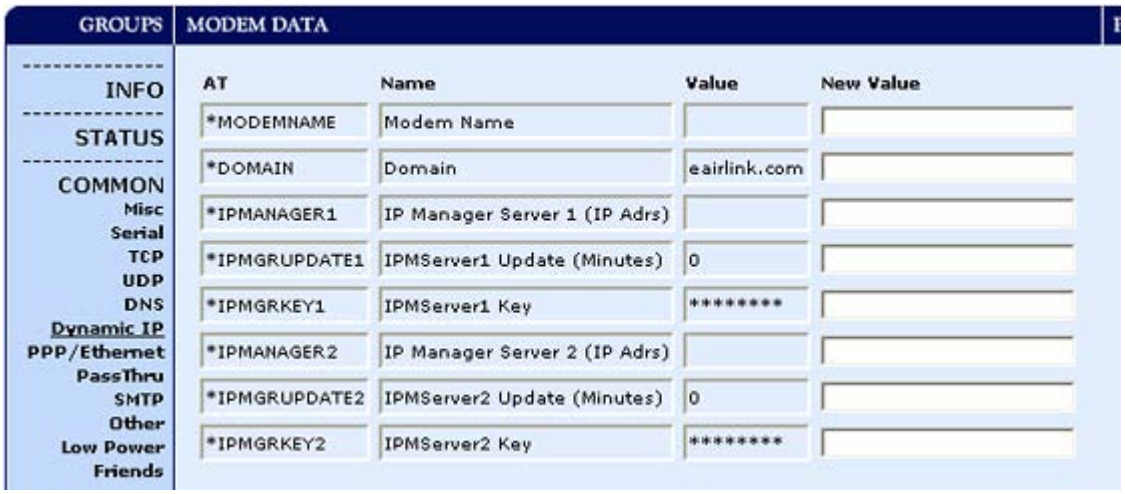
Dynamic IP

If you do not have a static IP, the host modem should be configured to report its current IP to a Dynamic DNS (DDNS) server with IP Manager (page 14).

In the Host modem's configuration, instead of IP address for the Addr List (ATMLIST or ATMLISTX), substitute a single unique name for each modem, i.e. remote1, remote2, etc.

When you configure IP Manager for the host modem, make note of your modem name and domain setting in Wireless Ace in the menu selection **Dynamic IP** to be used with the remote modems.

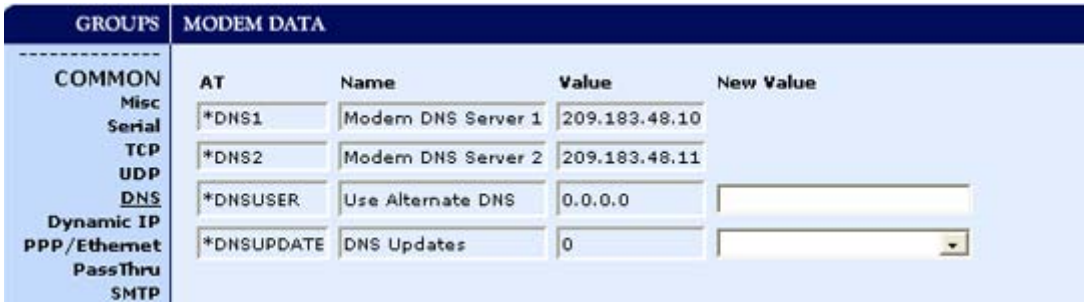
FIGURE 6. Wireless Ace: Modem Name and Domain



With names instead of IP addresses for the Address List, the host modem will query the DNS server for the current IP address assigned to the specific name of a remote modem to send a message corresponding to the ID.

When you use names instead of IP adrresses, to ensure your modems are updated quickly with the correct IP addresses for the names, you will want to set the DNS settings as well. In Wireless Ace, select **DNS**.

FIGURE 7. Wireless Ace: DNS



Configure ***DNSUSER** to the same IP address as the IP Manager (*IPMANAGER1). If your modems have dynamic IP addresses and not static (the IP address can change when it is powered up), configure ***DNSUPDATE** to a low interval to allow frequent updates.

Configuring the Remote Modems for Modbus with UDP

This section covers standard Modbus, variations may need additional commands.

1. Configure the ports for the host.

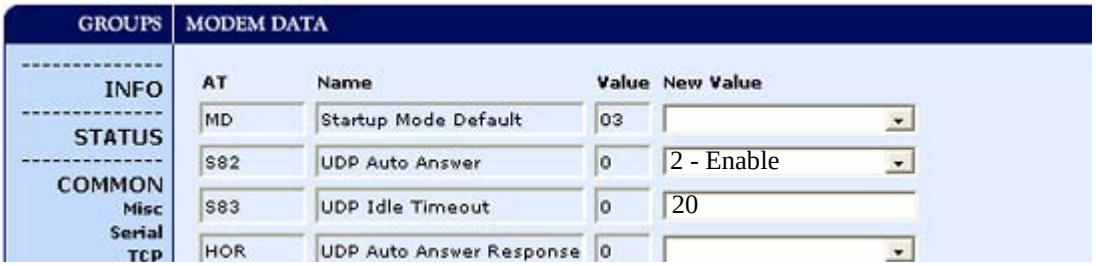
The destination port for the modem at the host needs to match the device port in use on all the modems at the remote sites. For example, if the remote modem's device port (*see below*) is "12345", then the Modbus host modem's **S53** destination port should be set to "12345".

In Wireless Ace, select **Misc** in the side menu. Set the destination port (**S53**) to match the device port of the host modem (***DPORT**, *above*). Make sure the device port of the remote modem (***DPORT**) matches the destination port of the host modem (**S53**, *above*).

2. Configure the default mode for start-up.

Each modem at the remote locations will need to be configured to communicate with the modem at the host. In Wireless Ace, select **UDP** in the side menu. Enable **S82**, UDP auto answer, and set **S83** to the idle timeout applicable to your application.

FIGURE 8. **Wireless Ace: UDP Power-up Mode**



3. Configure IP addresses for the host.

If the Host modem has a static IP address, enter it in the Destination Address for **S53**. In Wireless Ace, select **Misc** in the side menu.

Setting the Host modem IP address as the **S53** Destination Address provides a low level security. The modem will not forward UDP traffic unless the source IP/port matches what is in S53.

However, if you set ***AIP=1**, the modem will forward UDP traffic from any source IP address as long as it is accessing the modem on the configured ***DPORT**.

FIGURE 9. **Wireless Ace: Destination IP**

Dynamic IPs

If you do not have static IPs, the remote modems need to be configured to report their current IPs to a Dynamic DNS (DDNS) server with IP Manager (page 14). You will need to match the name of the modem to the names specified in the host modem's MLIST or MLISTX for the connected RTU.

Instead of an IP, for **S53**, specify the name of the host modem (*MODEMNAME). If the remote modems are using a different DDNS than the host modem, you will need to specify the fully qualified domain name (*MODEMNAME+*DOMAIN).

With a name instead of IPs for the host modem, the remote modems will query the DNS server for the current IP assigned to the host modem before sending data back to the host.

4. Configure other RTU settings.

Other parameters may need to be changed, but this is dependent on the RTU type being used. As a minimum, this typically involves setting the proper serial settings to match your RTU.

5. Mount the modem at the host or with the RTU.

FIGURE 10. Raven mounted in an enclosure with an RTU

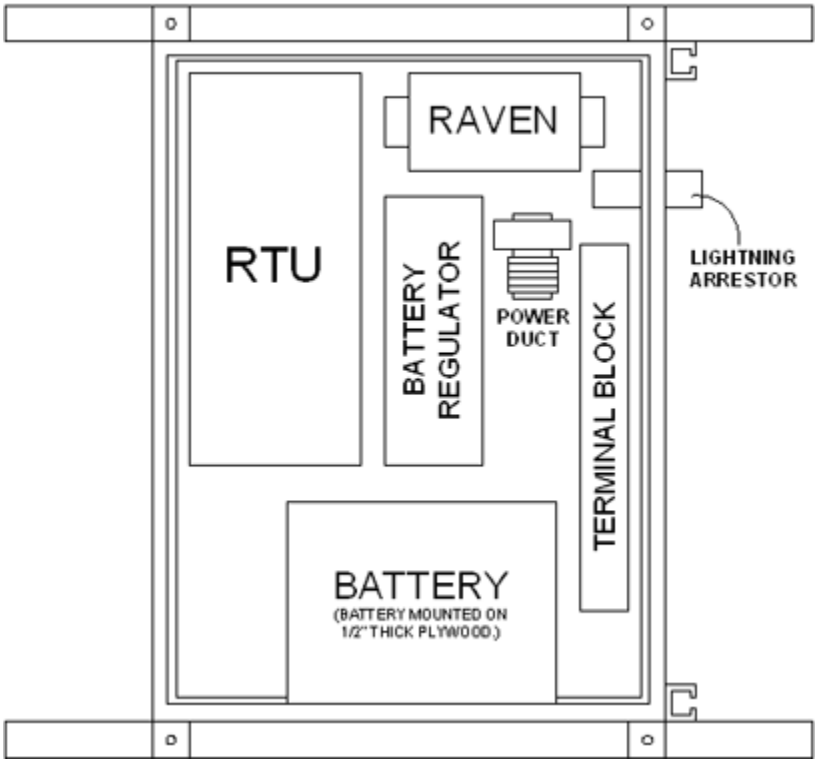


FIGURE 11. Power Connections

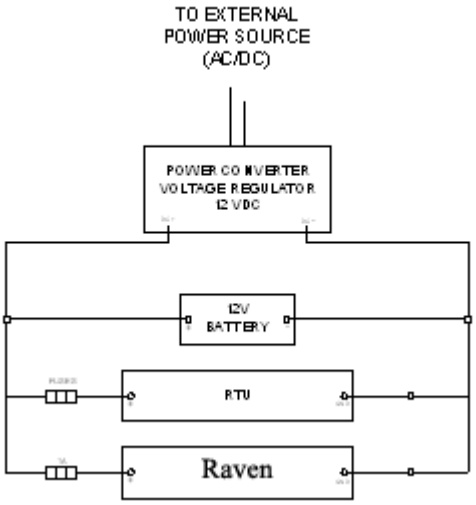
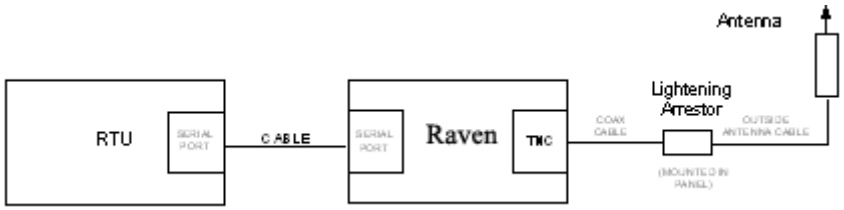


FIGURE 12. RTU to Raven setup



CHAPTER 7

Hardware Installation

Your AirLink Raven should be mounted in a position that allows easy access for the cables so they are not bent or constricted. The LEDs on the front panel should be visible for ease of operational verification. You should ensure that there is adequate airflow around the modem but that it is kept free from direct exposure to the elements (sun, rain, etc.)

An optional accessory for your Raven is a mounting kit. The bracket is designed to snugly cradle the modem and hold it in place where you need it.

Modem placement with grounding information and diagrams of the mounting bracket can be found in the Appendix, “Modem Placement” on page 43.

FIGURE 1. Raven connecters

Connecting the Antenna

Antennas selected should not exceed a maximum gain of 5 dBi under standard installation configuration. In more complex installations (such as those requiring long lengths of cable and/or multiple connections), it’s imperative that the installer follow maximum dBi gain guidelines in accordance with the FFC’s regulations.

Your AirLink Raven will work with most Dual-Band PCS cellular antennas with a TNC connector that works in the high and low frequencies of EDGE/GPRS . Connect the antenna or RF cable directly to the antenna connector on the back of the Raven.

Connecting Power

Your Raven can be used with either DC (available in most automobiles) or 110 AC (standard US wall power) with the appropriate power adapter (available from AirLink).

The power cable positive lead should be connected to the battery or power source positive terminal. The power cable negative lead should be connected to the battery or power source negative terminal.

Note: When using a DC power source (such as a car battery or solar cell), AirLink recommends placing a fuse (1-2 Amp) on the line close to the power source to protect your power source from possible surges due to shorts or other line issues.

Connecting the Raven to a computer or other device

Your Raven's serial port can be connected directly to most computers or other devices using a standard straight through cable. If you have a DCE device, you will need a null modem or null modem cable.

Your Raven can also be connected to a USB to serial device connected to a computer or other device which does not have an available serial port but does have USB.

Raven Indicator Lights

When your Raven is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode.

FIGURE 2. Raven indicator lights

Tx (transmit) and **Rx** (receive) - Lights will flash as data is transferred to and from the Raven on the remote network.

RSSI(signal level) - Light shows the strength of the signal and may be nearly solid (strong signal) or flashing (weaker signal). A slow flash indicates a very weak signal.

Reg (registation) - Indicates the Raven has acquired an IP from Cingular.

Chan (channel) - Indicates the modem has acquired a network channel.

Link - Indicates a successful connection to the cellular network.

Pwr (power) - Indicates the power adapter is connected and there is power getting to the modem.

The **Reset** button performs the same function as unplugging power from the modem and plugging it back in. Reset will not alter any saved configuration settings.

APPENDIX 8

Modem Placement

When decided on a location to install your Raven, make sure the modem will be away from direct exposure to the elements (sun, rain, etc.). Excess cables can be bundled and tied with twist-ties or other appropriate binders, but the less the cable is wrapped and bound together, the better the modem will perform.

Optional Mounting Kit

An optional accessory for your modem is a mounting kit. The bracket is designed to snugly cradle the modem and hold it in place where you need it.

The Raven "snaps" into place in the bracket locking into the grooves on the Raven case. The bracket can be further secured with a twist-tie set into the grooves on the top for situations where the Raven may be subjected to violent movement, such as in the back of an automobile. In most stationary installations, such as in a field or pipe, the Raven and bracket shouldn't require a twist-tie.

The bracket can be attached to the location using #6 screws (mounting hole diameter approximately 0.150").

FIGURE 1. Mounting Bracket

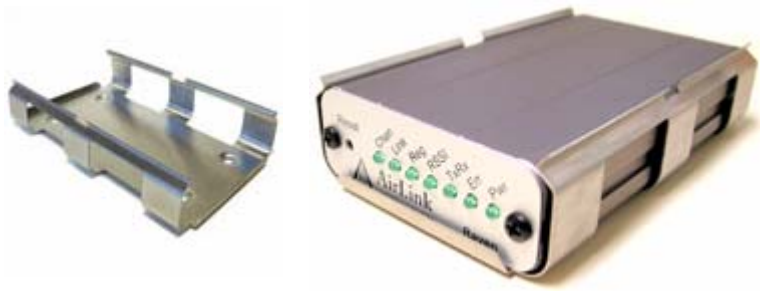


FIGURE 2. Raven Mounting Bracket, part number 100-170-1009 A

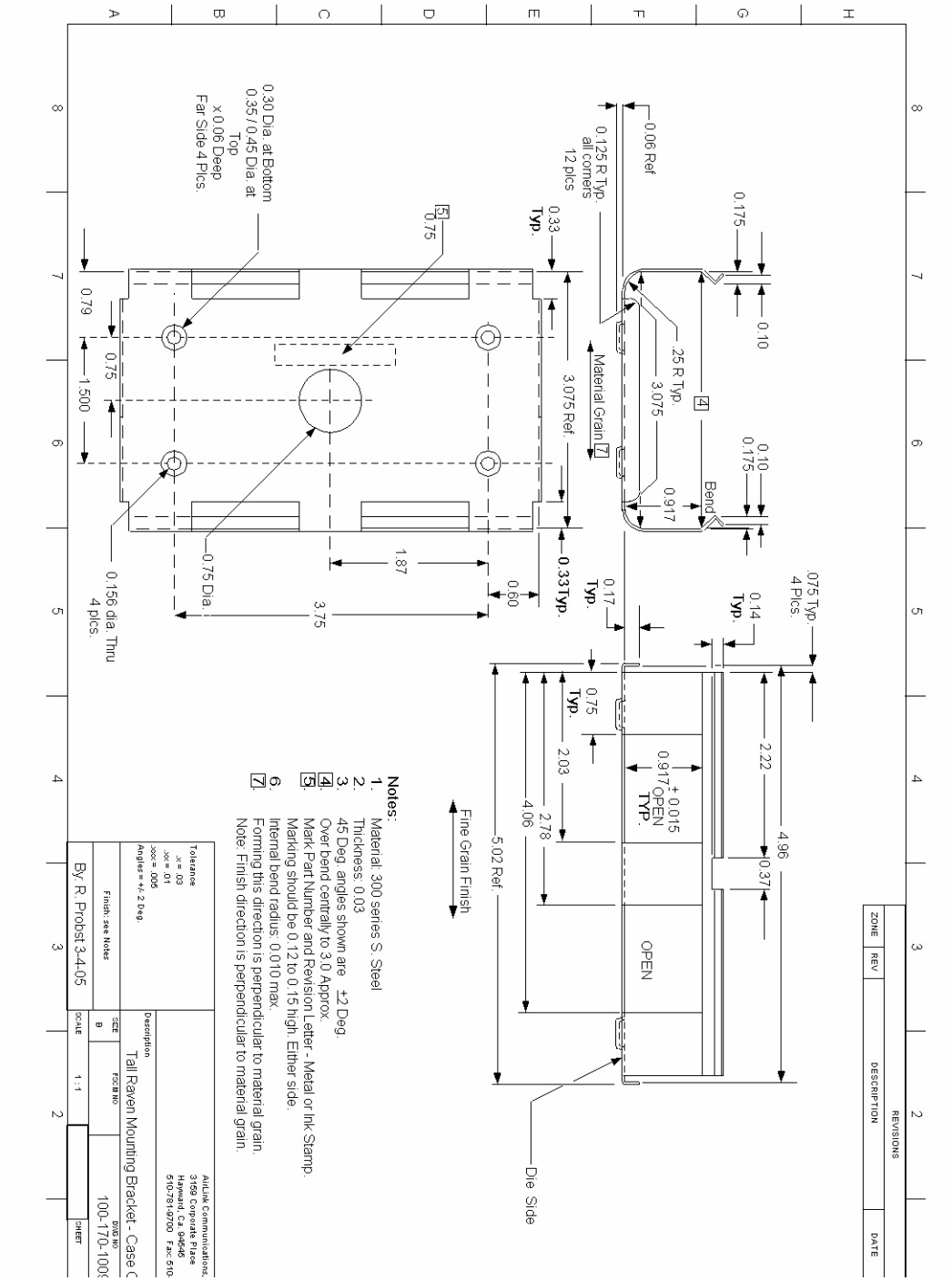
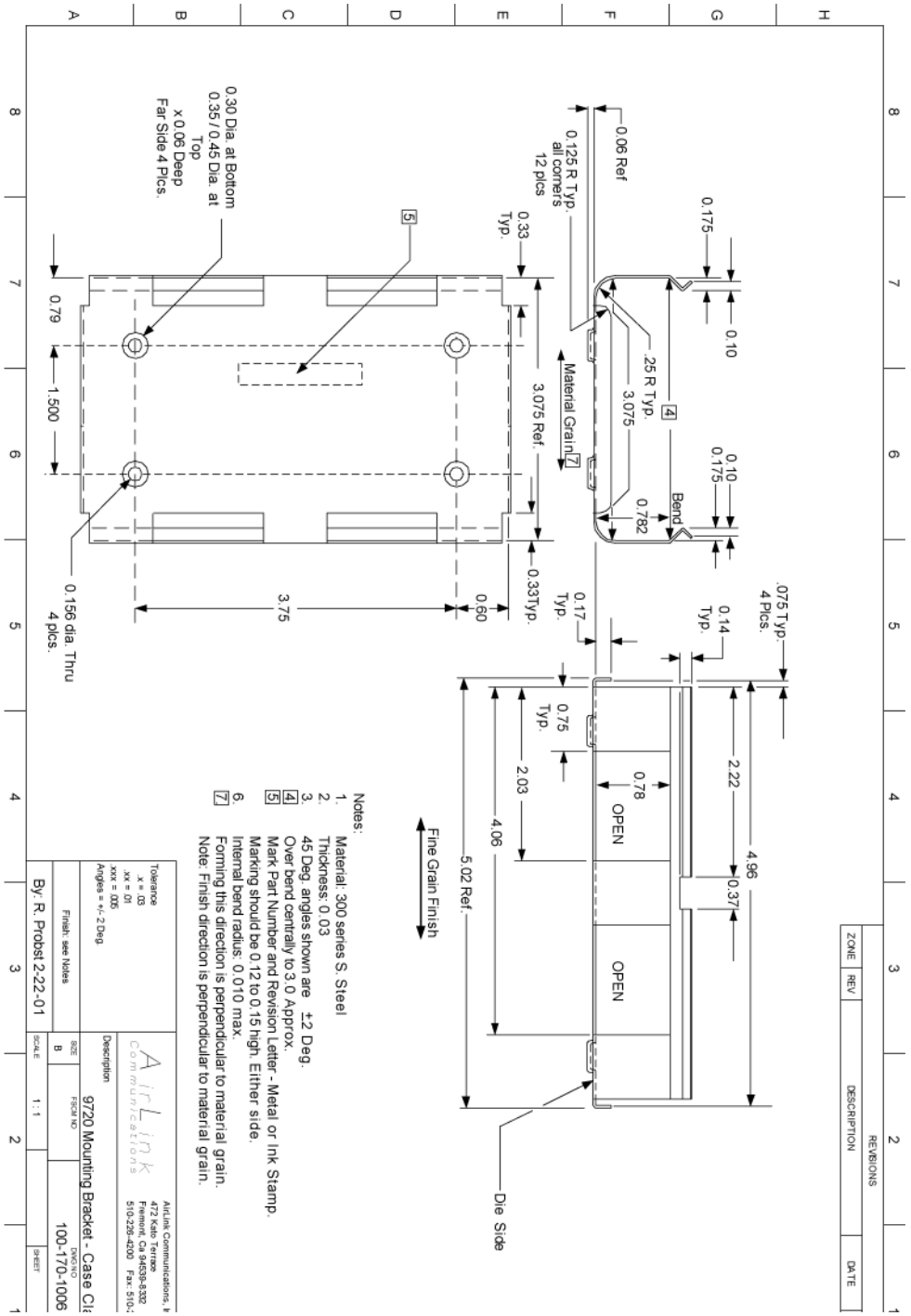


FIGURE 3. Raven Mounting Bracket, part number 100-170-1006 A



Installing a Raven with an RTU

The Raven can be installed in the same enclosure with an RTU and share the power supply. The power cable positive lead should be connected to the battery or power source positive terminal. The power cable negative lead should be connected to the battery or power source negative terminal. The Raven has an internal polysilicon circuit breaker that opens at 0.5 to 1.0 amps of current.

FIGURE 4. Raven / RTU Power Connections

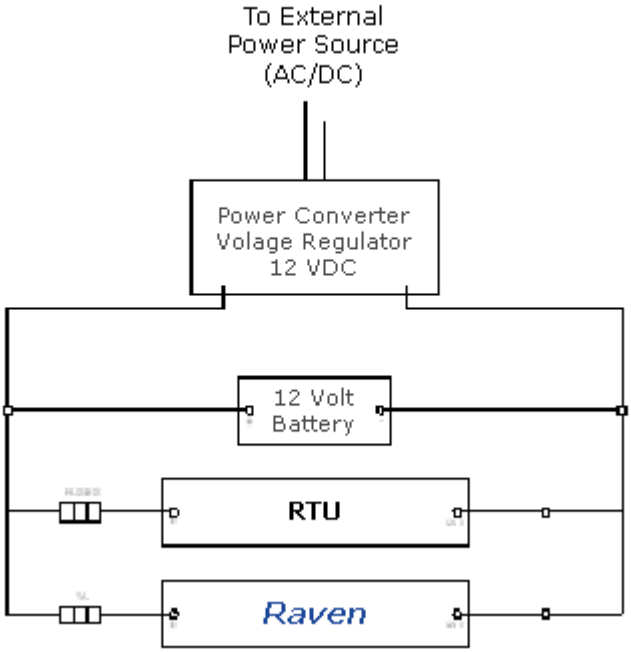


FIGURE 5. RTU to Raven

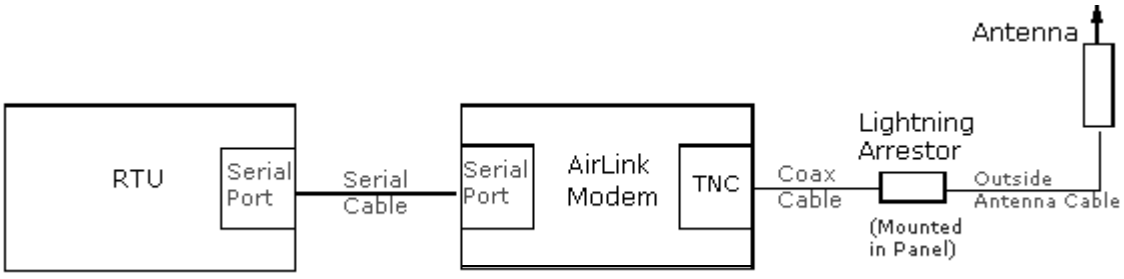
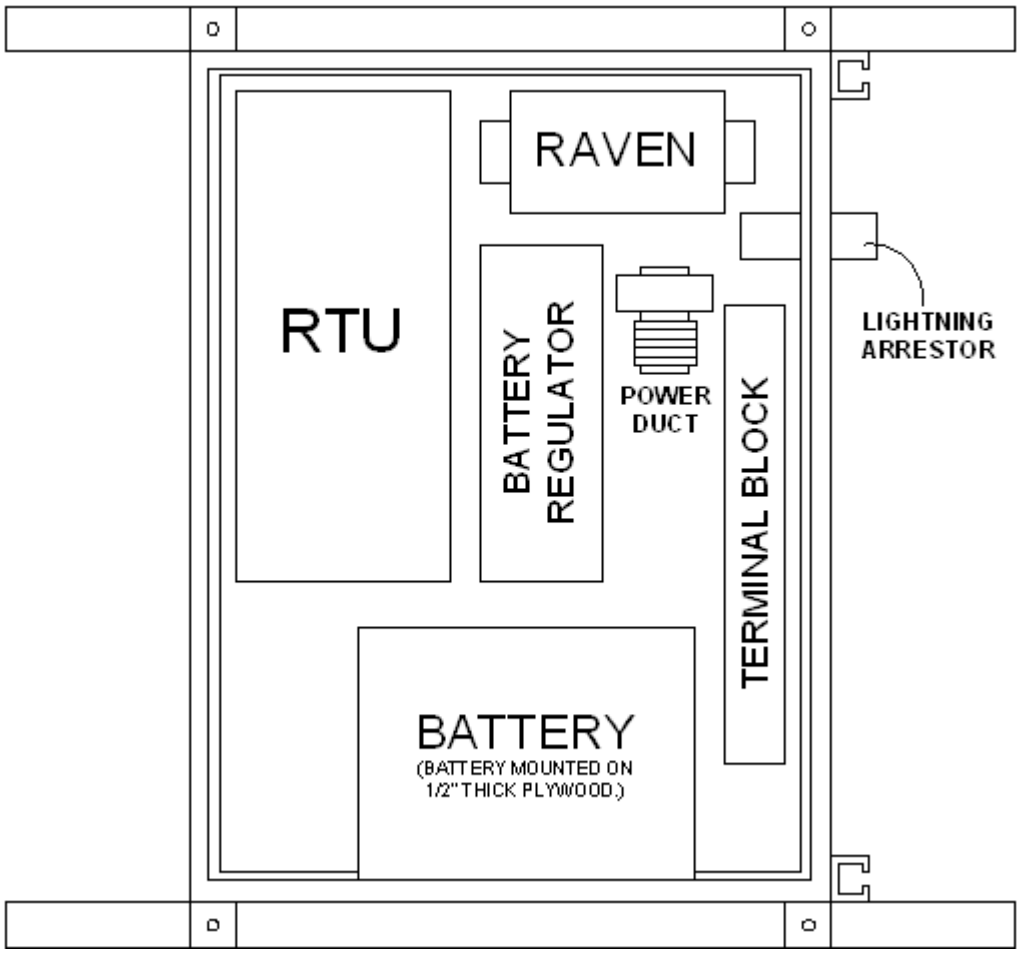


FIGURE 6. Raven mounted in an enclosure with RTU



APPENDIX 1

Specifications for the Raven EDGE/ GPRS

Physical Characteristics:

- Weight: < 1 lb
- RF Antenna Connector: 50 Ohm TNC
- Serial Interface: RS232 DB-9F with 1200-115200 bps (see below for diagram)
- Status LEDs

Data Services & RF Features

- Quad Band GPRS/EDGE (850, 900, 1800 and 1900 MHz)
- EDGE (MS Class 10) w/ GPRS (MS-12) Fallback
- EDGE data rates 236 Kbps maximum, 70-90 typical downlink and 118 maximum, 50-60 typical uplink
- GPRS data rates 7.6 Kbps maximum, 30-50 Kbps typical downlink /uplink
- Coding Schemes 1-9, Full PBCCH Support
- Network: 1900/850 MHz GPRS
- Transmit frequency: 1850-1910 MHz and 824-849 MHz
- Transmit power range at antenna port: 1.0 W for 1900 MHz and 0.8W for 850 MHz
- Transmitter can reduce output power when near a base station as per GSM specifications
- Receiver frequency: 1930-1990 MHz and 869-894 MHz
- Receiver sensitivity: typical -107 dBm (2.439% bit error rate)
- Multislot Class 8
- Circuit Switched Data Capable (14,400 Transparent and Non-Transparent Modes)

Environmental:

- Operating ranges: -30°C to +°C
- Humidity: 5%-95% Non-condensing

Power Management:

- Low power consumption
- Dormant connection (idle for 10-20 seconds): at 12 VDC
- Input Voltage: 9 VDC to 28 VDC
- Input Current: 20 mA to 350 mA

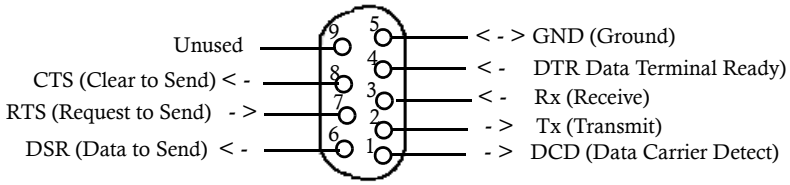
Power consumption

Modem	Idle	Transmitting
Raven	60 mAh	310 mAh

Serial Port Pinouts

The cable between the Raven and a computer or other serial device needs to be wired straight-through (pin 1 goes to pin 1, pin 2 to pin 2, etc.). If your end device connected to the Raven is a DCE device, you will need a null-modem cable.

FIGURE 1. : Female DB-9 DCE



APPENDIX 2

AT Commands

Wireless Ace is a graphical interface for configuring your Raven. It is highly recommended that you use this utility to modify any parameters, however a terminal emulation application, such as HyperTerminal, see below, can be used instead with typed AT commands.

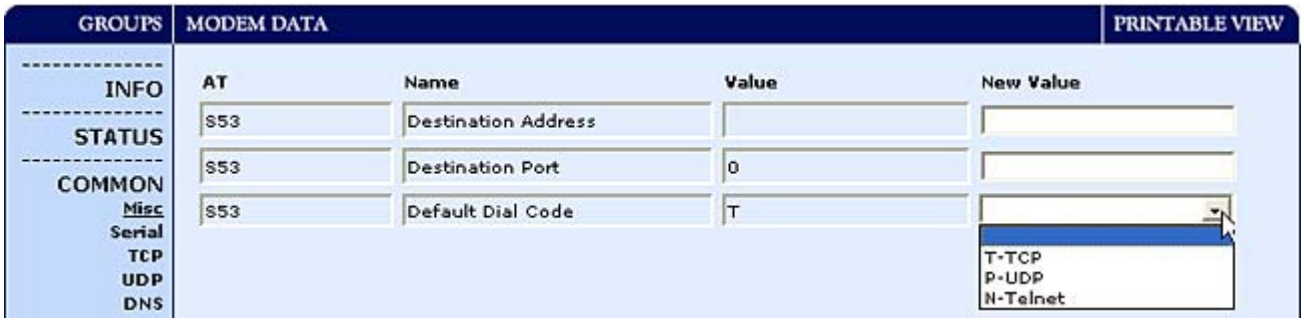
Note: Some commands can only be configured using a terminal emulation and typed AT commands. Some commands also require PassThru mode.

You can use a fully qualified domain name instead of an IP address for most configuration options calling for an IP address if your is configured to use DNS. DNS settings frequently come directly from Cingular while your is registering on the cellular network and receiving it's IP address.

Using Wireless Ace

With Wireless Ace, you only need to find the command listed and then enter the new value in the space provided. For those commands which have specific parameters, the choices will be in a drop down menu.

FIGURE 1. Wireless Ace: Entering new configuration values



To set or commit the changes in the modem, use the **Write** button at the top of Wireless Ace interface.

FIGURE 2. Wireless Ace: Tool bar

For more information on using Wireless Ace, please refer to the **Wireless Ace User Guide**.

With Wireless Ace, you can create a template from one modem and then use that template to configure other modems in the exact same way. You can use the template in AceNet, too, to configure several modems at the same time with the same parameters.

FIGURE 3. Wireless Ace: Save / Load a Template

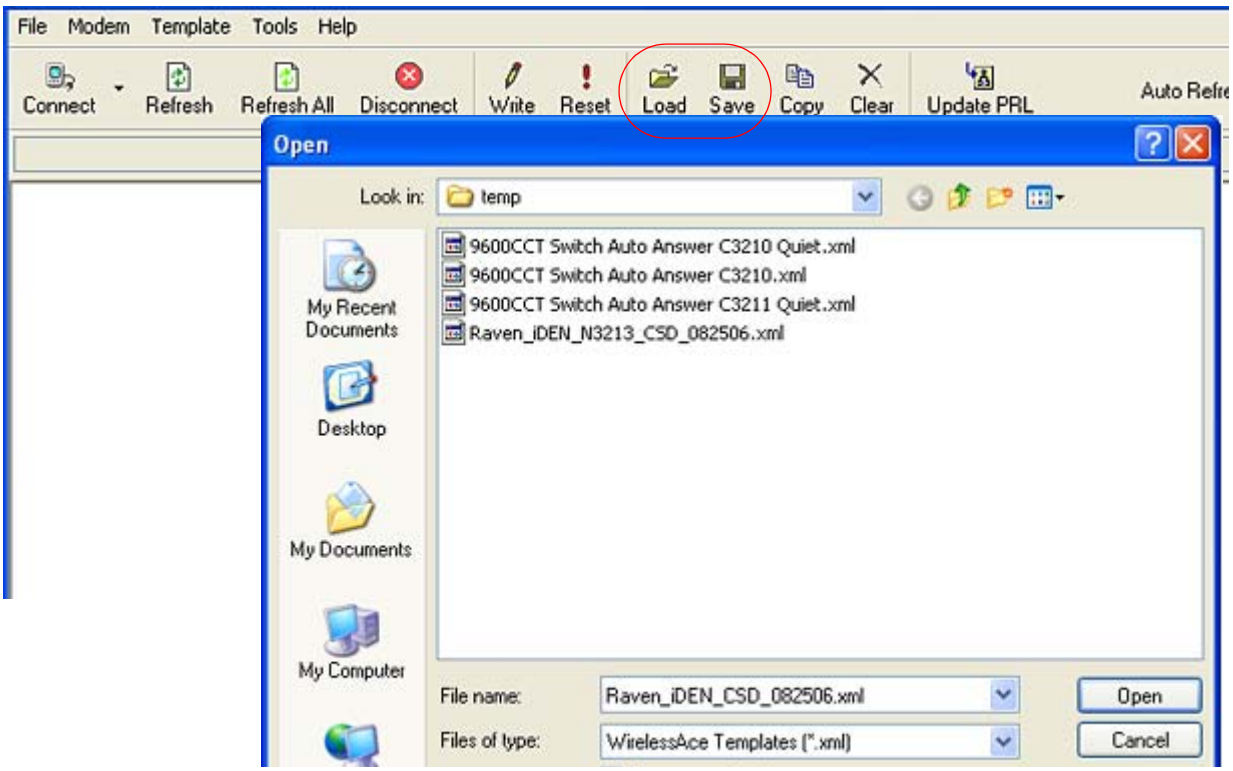
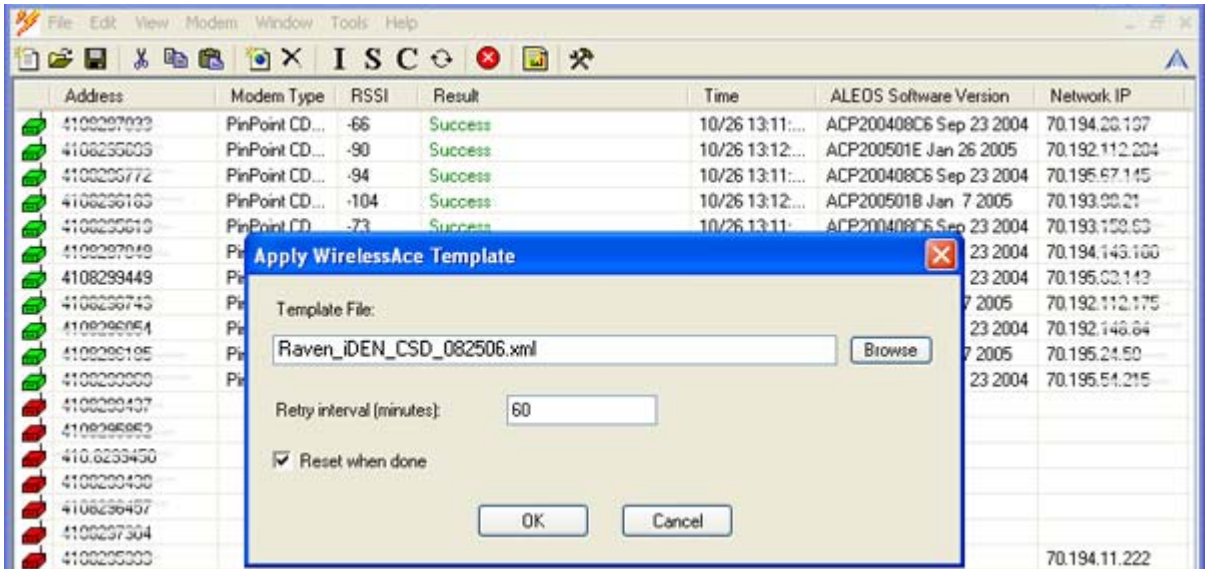


FIGURE 4. AceNet: Load a Template



Using Telnet Terminal Emulation

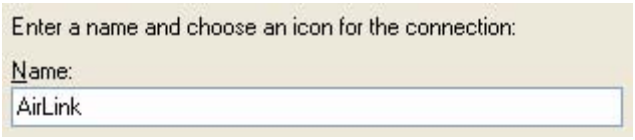
It is possible to communicate with the Raven across a TCP/IP network. Telnet provides a terminal style connection to the Raven.

Most installations of Microsoft Windows come with a version of HyperTerminal (used here for specific directions), but you can use any other Telnet application, such as Putty, Terra Term, etc.

Start>All Programs>Accessories>Communications>HyperTerminal

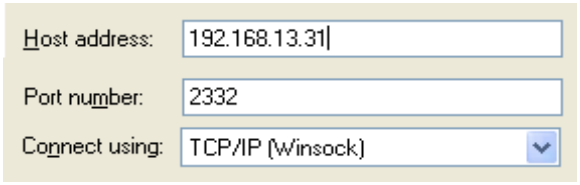
1. Choose a name for your connection, such as **Raven** or **AirLink**. The name and icon are only for your own reference so you can find the connection at a later date (if you want to have a connection saved for both local and remote, it is recommended the connection name reflect the connection type (example, Raven Remote).

FIGURE 5. HyperTerminal: Connection Name



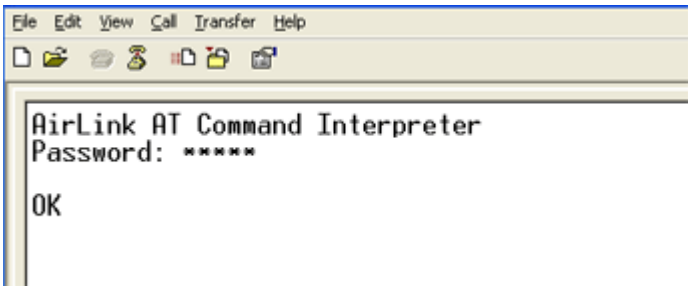
2. Select TCP/IP (Winsock) for **Connect Using**. If the modem is connected directly to your computer's Ethernet port, put in the **host address** of **192.168.13.31** or the *HOSTPEERIP. If the modem is remote, the **host address** will be the current Internet IP of the Raven. Change the **port number** to **2332** (default telnet port for the Raven).

FIGURE 6. HyperTerminal: TCP/IP Settings



3. When HyperTerminal connects to the Raven, you will be prompted for a password. The default password is **12345**. When you press ***Enter***, you should get back a reply of "OK".

FIGURE 7. HyperTerminal: AT mode via Telnet



4. Type **AT** and press ***Enter***. You should get a reply of "OK" or "0".
5. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type **ATE1V1** and press ***Enter***.

If you get a reply of "OK", then you entered the command successfully. If you get a reply of "0" or "ERROR", try entering the command again.

Note: You may need to enable Telnet Echo in your terminal emmulation application in order to see the commands you type as you type. In HyperTerminal, select *File > Properties*. Select the *Settings* tab. Click the *ACSII Setup* button. Check *Echo typed characters locally.*

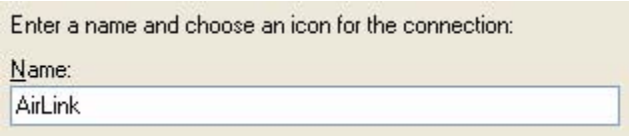
Direct Serial Connection

Using HyperTerminal, included with most installations of Microsoft Windows:

Start>All Programs>Accessories>Communications>HyperTerminal

1. Choose a name for your connection, such as **Raven** or **AirLink** (if you want to have a connection saved for both local and remote, it is recommended the connection name reflect the connection type, i.e. Raven local). The name and icon are only for your own reference so you can find the connection at a later date.

FIGURE 8. HyperTerminal: Connection Name



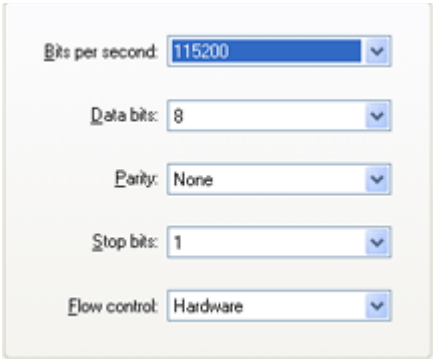
2. Select COM1 (or the comport to which the modem is connected) for the **Connect Using**.

FIGURE 9. HyperTerminal: Comport Setting

3. Change the **Bits per Second** to 115200 (default), **Data Bits** to 8, **Parity** to None, **Stop Bits** to 1, and **Flow Control** to Hardware.

Note: If you have configured the Raven for settings different than the defaults for Bits per Second, Data Bits, Parity, and/or Stop Bits, you will need to use your changed settings.

FIGURE 10. HyperTerminal: Comport Settings



4. Type **AT** and press ***Enter***. You should get a reply of “OK” or “0”. .
5. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type **ATE1V1** and press ***Enter***.

If you get a reply of “OK”, then you entered the command successfully. If you get a reply of “0” or “ERROR”, try entering the command again.

Using AT Commands with a Terminal Application

- The following pages list the AT commands, their parameters, and explain what they do. For most commands, when you are entering them using a terminal connection, you will need to preface the command with **AT** (exceptions are noted), i.e. **ATA** which listed as **A**
- Some commands have specific parameters while other commands will take whatever you type.
- Acceptable parameters and/or specific formats are in the parameters column.

- Required variable parameters are denoted with italicized text, example, D*n*. The *n* is variable and noted in the parameters column.
- Optional parameters are denoted with square brackets [ ].
- Most commands with parameters can be entered with ? to read the current value (for example, **AT&D?** will respond with "2" if the default has not been changed).
- AT Commands are not case sensitive. A capital "E" is the same as a lower-case "e".
- When you are using a terminal connection, if you enter a command which is recognized by the Raven, it will respond with "OK". If the command is not recognized, the response will be "ERROR".
- Those commands applicable only to certain model numbers of the Raven will be noted.

Caution: Symbols listed with commands, such as *, /, **&**, or **?**, are part of the command and must be included. Commands with symbols other than * may require PassThru mode.

AT Command Listing

Symbols

&C 68
&D 68
&S 69
&V 60
&W 69
*CSX1 81
*CTSE 69
*DATE 62
*DATZ 85
*DBGCOMLVL 89
*DBGIPLVL 89
*DBGPPPLVL 89
*DEVICEID 58
*DNS 76
*DNSUPDATE 76
*DNSUSER 76
*DOMAIN 77
*DPORT 62
*DU 74
*ENQ 72
*HOSTAUTH 79
*HOSTMODE 58
*HOSTNETMASK 79
*HOSTPAP 62
*HOSTPEERIP 79
*HOSTPRIVIP 79
*HOSTPRIVMODE . . . 80
*HOSTPW 80
*HOSTUID 80
*IDENUDPFWD 74
*IPMANAGER 77
*IPMGRKEY 78
*IPMGRUPDATE 78
*IPPING 86
*IPPINGADDR 86
*MODEMHISPEED . . . 70
*MODEMNAME 78
*MSCIUPDADDR 86
*MSCIUPDPERIOD . . 86
*NETALLOWZEROIP . 62
*NETAPN 95
*NETERR 58
*NETIP 59
*NETOK 59
*NETOP 59
*NETPHONE 59
*NETPHONE? 62
*NETPW 62
*NETRSSI 59
*NETSERV 59
*NETSMS2EMAIL . . . 84
*NETSTATE 59
*NETUID 62
*NETWDOG 86
*NUMTOIP 70
*PTINIT 81
*PTREFRESH 81
*RESETPERIOD 81
*SMTPADDR 83
*SMTPFROM 83
*SMTPPW 83
*SMTPSEND 84
*SMTPSTATUS 84
*SMTPSUBJ 84
*SMTPUSER 84
*SNMPPORT 86
*SNMPSECLVL 87
*SNMPTRAPDEST . . 87
*SNTP 87
*SNTPADDR 87
*STATICIP 63
*STATUSCHK 63
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Information and Status

Most of the commands in the “Info” and “Status” groups as well as other groups have read-only parameters. They only provide information and cannot be changed using Wireless Ace (some can be changed using AT Commands with a terminal application).

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem.

The commands of these two groups are intermingled. The Status Group has more fields that can be displayed on most screens, either resize your screen or use the scroll bar on the side to display the remainder.

Note: Those commands which are not displayed with Wireless Ace may require PassThru mode.

FIGURE 1. Info Group

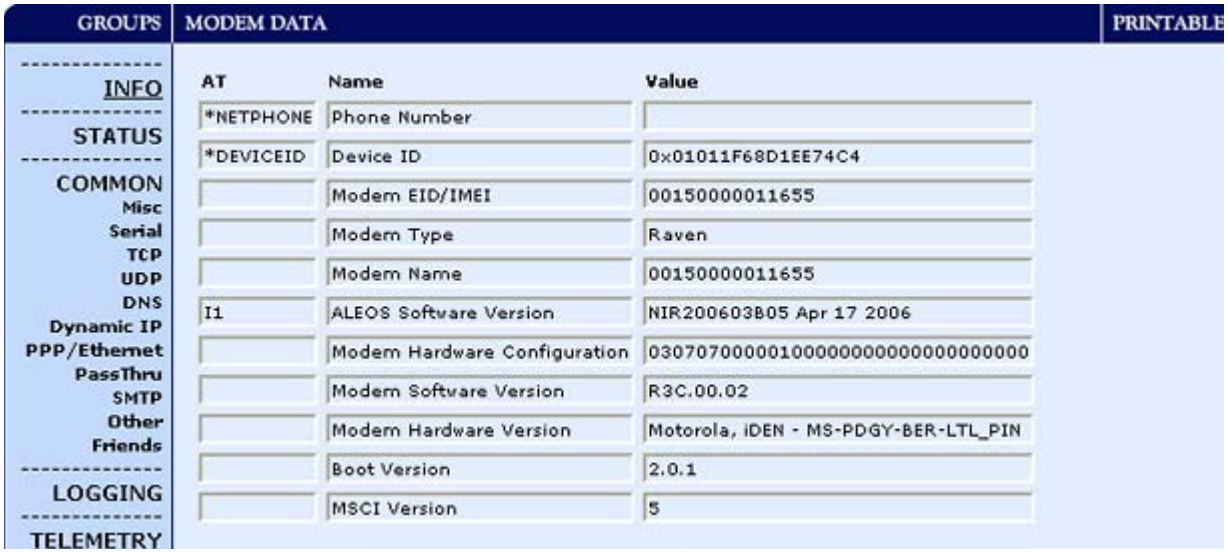


FIGURE 2. Status Group

I[*n*]

n=0 Product name (for example, Raven Raven-E).

n=1 The Raven's firmware (ALEOS) version, hardware ID, and copyright.

n=2 The internal hardware's firmware version and relevant hardware ID.

n=3 The hardware module's unique ID (ESN).

n=5 View active profile (the contents of the active registers).

N=5 is not displayed with Wireless Ace.

*DEVICEID?

The 64-bit device ID the modem uses to identify itself to the cellular network.

*HOSTMODE?

The current host mode (AT, PPP, UDP, etc.). If the Raven is not in AT mode, telnet into the modem to execute this command.

*NETERR?

The EDGE or GPRS network bit error rate.

*NETIP?

The current IP address of the modem reported by the embedded OEM module (generally obtained from Cingular your cellular carrier). This is the address to which packets can be sent in order to contact the Raven modem from the Internet.

Use ***NETALLOWZEROIP** if you need to allow the display of an IP ending in a zero .

Note: If there is no current network IP, 0.0.0.0 may be displayed.

*NETOP?

The current cellular carrier (for example, Cingular) from the modem's firmware version.

*NETPHONE?

The modem's phone number (if applicable or obtainable).

*NETRSSI?

The current RSSI (Receive Signal Strength Indicator) of the Raven as a negative dBm value.

The same information is displayed with the command **S202?**.

*NETSERV?

The type of service being used by the modem (for example EDGE/GPRS).

*NETSTATE?

The current network state:

- **Connecting To Network**

  The Raven is in the process of trying to connect to the EDGE/GPRS network.

- **Network Authentication Fail**

  Authentication to the EDGE/GPRS network has failed. Verify settings to activate the Raven.

- **Data Connection Failed**

  The Raven failed to connect, and it is now waiting a set time interval before it attempts to reconnect. Verify settings to activate the Raven.

- **Network Negotiation Fail**

  Network connection negotiation failed. This is usually temporary and often clears up during a subsequent attempt.

- **Network Ready**

  The Raven is connected to the EDGE/GPRS network and ready to send data.

- **Network Dormant**

  The Raven is connected to the EDGE/GPRS network, but the link is dormant. It will be woken up when data is sent or received.

- **No Service**

  There is no EDGE/GPRS network detected.

- **Hardware Reset**
  The hardware module is being reset. This is a temporary state.

&V

View active profile (the contents of the active registers).

Not displayed with Wireless Ace.

+CCID

Subscriber Identity Module ID

+CIMI

International Mobile Subscriber Identity

+ICCID

Subscriber Identity Module ID

+RCIQ

Current Cell Info

Information Displayed in Wireless Ace without AT Commands Listed

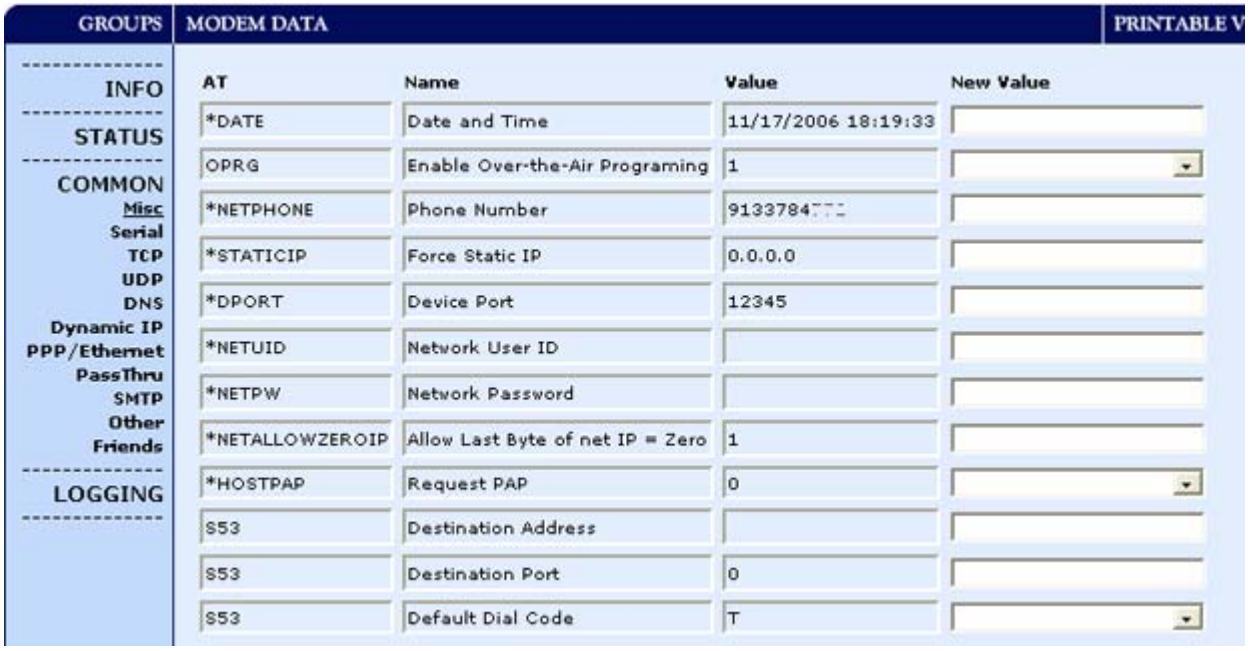
- **Bytes and Packets Received and Sent**
  Network traffic for the applicable port.
- **Number of System Resets**
  Counter of the number of system resets over the life of the modem or since the configuration was reset.
- **Bad Password Count**
  Counter of the number of bad password attempts.
- **IP Reject Count or Log**
  Rejected IP Data.
- **Versions of ALEOS, internal hardware, boot, and MSCI**
  Versions of internally configured hardware and software.

Misc (Miscellaneous)

This group includes configuration commands which are not specific to other groups.

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem.

FIGURE 1. Common : Misc



OPRG=*n*

Enables/disables over-the-air firmware upgrading of the Raven.

When AirLink releases a new verison of ALEOS, you can upgrade your remote modems with OPRG enabled.

n=**0 :** Disables

n=**1:** Enables

S53=*[method][d.d.d.d][/ppppp]*

Destination IP address, port, and method. These are used as defaults for the D (Dial) AT command.

method= **P :** UDP

method=**T :** TCP

method=**N :** Telnet

d.d.d.d=IP address or name

ppppp=the port address

Examples:

ATS53=T192.168.100.23/12345

ATS53=foo.earlink.com

Telnet to the specified IP at port 12345.

ATS53=192.168.100.23/12345

Query the specified IP at port 12345.

ATS53=/12345

Query port 12345.

DATE=[mm/dd/yyyy],[hh:mm:ss]*

Sets and queries the clock in the unit. Either the date and time can be specified, or simply one of the two can be specified in which case the unspecified value will remain unchanged. The date and time are always specified 24-hour notation.

mm/dd/yyyy = month, day, year

hh:mm:ss = time in 24-hour notation

*DPORT=*n*

The modem's Device Port which the modem is listening on for inbound packets/data/polls.. Can also be set with the command **S110**.

n=1-65535

*HOSTPAP=*n*

Use PAP to request the user login and password during PPP negotiation on the host connection.

n=**0 :** Disable PAP request (Default).

n=**1 :** Takes user login and password from Windows DUN connection and copies to *NETUID and *NETPW.

*NETALLOWZEROIP=*n*

Allows the displayed IP address in *NETIP to end in zero (ex. 192.168.1.0).

n=**0 :** Do not allow

n=**1 :** Allow

*NETPW=*pw*

The password that is used to login to Cingular's cellular network, when required.

pw=password

*NETPHONE?

The modem's phone number, if applicable or obtainable.

*NETUID=*uid*

The login that is used to login to Cingular's cellular network, when required.

uid=user id (up to 64 bytes)

*STATICIP=*d.d.d.d*

Set the static IP required to be received from the network. If the modem does not get this IP address from the network, it will reset the internal hardware and try again. The default is 0.0.0.0, which allows any IP address from the network.

d.d.d.d=IP address

Example: **AT*STATICIP=192.168.1.23**

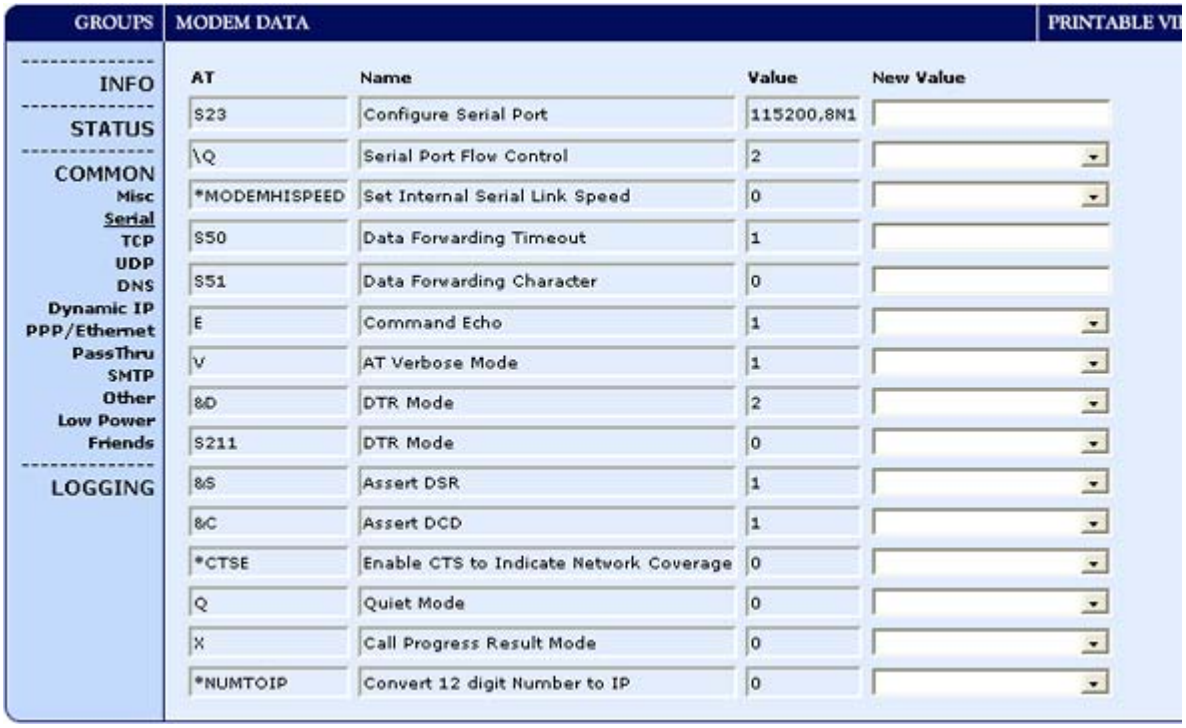
Caution: *STATICIP does not set the IP address of the modem, it merely tells the modem which IP address to expect. If the expected IP address is not granted while registering on the cellular network, the modem will try to register on the network again until it receives that IP address. If your account is set up for a dynamic IP address and you set an address for *STATICIP, you may not be able to register on the network at all since there is no guarentee you will receive the same dynamic IP address again.

Serial

This group includes commands specific to the serial port.

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem. Some of the commands in this section, as noted, are not available in Wireless Ace. Many of the commands not available with Wireless Ace require PassThru mode to use.

FIGURE 1. Common : Serial



+++

Note: This command is not proceeded by AT nor does it require a carriage return (enter).
There must be an idle time (set by **S50**) on the serial port before and after this command.

The "+" is ASCII 0x2B.

AT Escape sequence.

If the Raven is in a data mode (any mode other than PassThru), this command causes the modem to re-enter AT command mode.

Cannot be configured in Wireless Ace.

Note: This command does nothing if DAE=1.

A/

Note: This command is not proceeded by AT.

Re-execute last command.

Cannot be configured in Wireless Ace.

A

Manually answer an incoming connection.

Cannot be configured in Wireless Ace.

D*[method][d.d.d.d][/ppppp]* or D*[method][@name][/ppppp]*

Dial a connection to a remote IP and Port using *method*.

Cannot be configured in Wireless Ace.

method=**P :** Establish a UDP connection

method=**T :** Establish a TCP connection

method=**N :** Establish a Telnet connection

d.d.d.d=IP address to contact

ppppp=IP port to contact

Examples:

ATD - Dial (establish) default connection.

ATDP192.168.13.31/2332 - Dial (establish) UDP session to 192.168.13.31, at port 2332.

To end the connection, issue the **+++** escape sequence or drop the DTR line (if Ignore DTR **S211=0** or **&D2**).

The defualt connetion is set in **S53.**

If a domain name is specified, the '@' symbol can be used to explicitly indicate the start of the name. For example, if **ATDPHONY** is issued, this will be interpreted as dial a UDP connection to “HONY”. To dial using the default method to host “PHONY”, one would issue **ATD@PHONY**. .

If the method, IP address, or port is omitted, the values from **S53** are used. If a telnet connection is requested (N) and the port is not supplied, port 23 will be used instead of the value from **S53**.

Several special dialing numbers exist to make it easy to establish a PPP or SLIP connection with the modem. **ATD#19788** or **ATDT#19788** will establish a PPP connection (see \APPP) and **ATDT#7547** will establish a SLIP connection (see \ASLIP).

Note: The source port of the session is the Device Port (set by **S110** or ***DPORT**).

DS=*n*

Allows a PPP connection to be initiated on the host port.

n=**2 :** Initiates the PPP connection.

Cannot be configured in Wireless Ace.

E*n*

Toggle AT command echo mode.

n=**0 :** Echo Off

n=**1 :** Echo On

H*n*

Hang-Up Command.

n=**1:** Hang-up

With an AT telnet connection, this command will terminate the host data mode and return the Raven to an AT mode.

Cannot be configured in Wireless Ace.

O

Online (Remote): Causes the Raven to go from Command State to data state.

Cannot be configured in Wireless Ace.

Q*n*

The AT quiet-mode setting. If quiet mode is set, there will be no responses to AT commands except for data queried.

n=**0 :** Off (Default)

n=**1 :** Quiet-mode on

S3=*n*

Carriage Return Character

n=**0-127** (ASCII character number)

The standard end of line character used to indicate the end of an AT command. This character is also used as the carriage return character for framing responses and result codes in command state.

Cannot be configured in Wireless Ace.

S4=*n*

Line Feed Character

n=**0-127** (ASCII character number)

The standard line feed character sent by the modem to the host at the end of a response or return code in command state.

Cannot be configured in Wireless Ace.

S5=*n*

Backspace Character

n=**0-127** (ASCII character number)

This register sets the character recognized as a backspace during command entry.

Cannot be configured in Wireless Ace.

S6=*n*

Wait for Blind Dial

n=**2-10** seconds

This register denotes the wait time, in seconds, before a blind dial (no dial tone detection).

Cannot be configured in Wireless Ace.

S23=*[speed],[databits][parity][stop bits]*

Serial line parameters. The settings take affect after reset.

speed=300 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200 | 230400

databits=**7** or **8**

parity=**O :** Odd

parity=**E :** Even

parity=**N :** None

parity=**M:** Mark

stopbits=1 | 1.5 | 2

Example: **ATS23=19200,8N1** (sets modem to 19200, etc.)

Can also be set using **&L**=[*speed*],[*databits*] [*parity*][*stop bits*]

Note: Databits MUST be 8 data bits for PPP mode.

S50=*n*

Data forwarding idle time-out. If set to 0, a forwarding time-out of 10ms is used.

n=tenths of seconds

Used in UDP or TCP PAD mode.

S51=*n*

PAD data forwarding character.

n=ASCII code of character that will cause data to be forwarded.

n=**0 :** No forwarding character.

Used in UDP or TCP PAD mode.

S211=*n*

For applications or situations where hardware control of the DTR signal is not possible, the modem can be configured to ignore DTR. When Ignore DTR is enabled, the modem operates as if the DTR signal is always asserted.

n=**0 :** Use hardware DTR. (default).

n=**1 :** Ignore DTR.

n=**3 :** Ignore DTR and assert DSR. This value is deprecated, and it is recommended to use &S to control the DSR instead. When this value is set to 3, &S will automatically be set to 0. **See also:** &D and &S.

V*n*

Command Response Mode.

n=**0 :** Terse (numeric) command responses

n=**1 :** Verbose command responses (Default).

X*n*

Extended Call Progress Result mode.

n=**0 :** Turn off extended result codes (Default).

n=**1 :** Turn on result codes. This adds the text 19200 to the CONNECT response.

Z

Reset the Raven.

In Wireless Ace, this command is performed with the Reset option on the toolbar.

Note: This command does nothing if *DATZ=1.

&C*n*

Set DCD mode.

n=**0 :** Always assert DCD.

n=**1 :** Assert DCD when in a data mode (UDP, TCP, PPP, or SLIP) (Default).

n=**2 :** Assert DCD when the modem has network coverage.

&D*n*

Set DTR mode.

n=**0 :** Ignore DTR, same effect as HW DTR always asserted (same as S211=1).

n=**2 :** Use hardware DTR (same as S211=0).

&S*n*

Set DSR mode.

n=**0 :** Always assert DSR.

n=**1 :** Assert DSR when in a data mode (UDP, TCP, PPP, or SLIP) (Default).

n=**2 :** Assert DSR when the modem has network coverage.

Note: S211 can also be used to request that DSR is always asserted. If **S211** is set to **3** and **&S** is changed to a **non-zero** value, **S211** will be changed to **1**.

&W

Writes all changed modem settings. If this command is not issued, any modified values will revert back to their previous values at modem reset.

Cannot be configured in Wireless Ace.

\APPP

Set modem operation to PPP mode.

Cannot be configured in Wireless Ace.

\ASLIP

Set modem operation to SLIP mode. DTR must be asserted (**&D0** or **S211=1**).

Cannot be configured in Wireless Ace.

\Q

Set or query the serial port flow control setting.

n=**0 :** No flow control is being used.

n=**1 :** RTS/CTS hardware flow control is being used.

n=**4:** Transparent software flow control. Uses escaped XON and XOFF for flow control. XON and XOFF characters in data stream are escaped with the @ character (0x40). @ in data is sent as @@.

*CTSE=*n

Clear To Send Enable: This feature asserts CTS when there is a network connection.

n=**0 :** Disabled (Default).

n=**1 :** Enable assertion of CTS when there is network coverage.

RS232 voltage levels:

Positive = Network coverage.

Negative = No coverage.

Note: Flow control (**AT\Q**) will override this indication, so if you want to use CTS to indicate network coverage, flow control has to be off (**AT\Q0**).

*MODEMHISPEED

Set the internal serial link speed to the radio (modem) module.

May not be available for all modem models.

*NUMTOIP=*n*

Convert 12 digit number to IP.

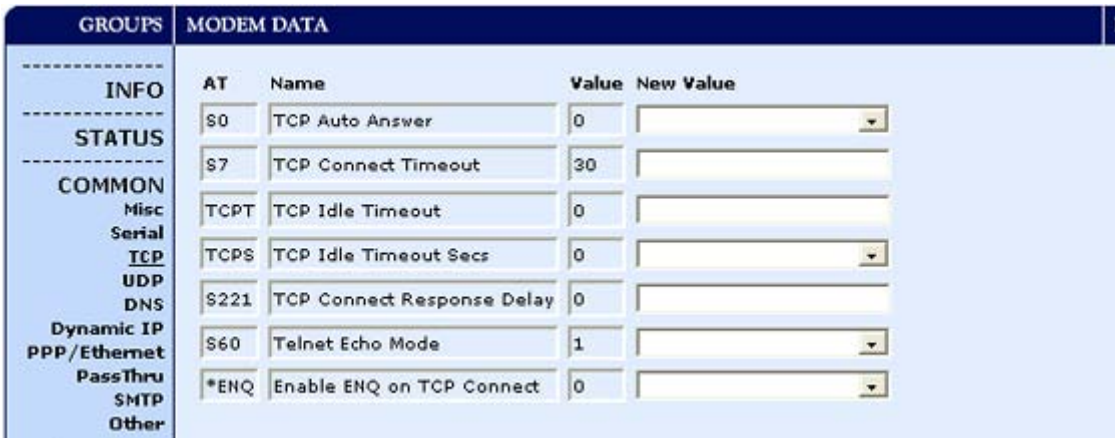
n=**0 :** Use as name.

n=**1 :** Use as IP address.

TCP

This group includes commands specific to TCP communications.

FIGURE 1. Common : TCP



S0=*n*

This register determines how the Raven responds to an incoming TCP connection request. The Raven remains in AT Command mode until a connection request is received. DTR must be asserted (**S211=1** or **&D0**) and the Raven must be set for a successful TCP connection. The Raven will send a “RING” string to the host. A “CONNECT” sent to the host indicates acknowledgement of the connection request and the TCP session is established.

n=**0 :** Off (Default)

n=**1 :** On

n=**2 :** Use Telnet server mode on TCP connections.

n=**3 :** With a Telnet connection, overrides the client's default echo, allowing the server on the host port to perform the echo. CRLF sequences from the telnet client will also be edited to simply pass CRs to the server on the host port.

S7=*n*

Specifies the number of seconds to wait for a TCP connection to be established when dialing out.

n=seconds

S60=*n*

Telnet Client Echo Mode.

n=**0 :** No Echo

n=**1 :** Local Echo (Default)

n=**2 :** Remote Echo

S221=*n*

Connect Delay:

***n*= 0 - 255**

Number of seconds to delay the “CONNECT' response upon establishing a TCP connection.

OR

Number of tenths of seconds to delay before outputting ENQ on the serial port after the CONNECT when the ENQ feature is enabled (see *ENQ).

TCPS=*n*

TCP connection time-out (TCPS) units. Specifies a time interval upon which if there is no in or outbound traffic through a TCP connection, the connection will be terminated.

n=minutes (TCPS=0) or seconds (TCPS=1)

TCPT=*n*

TCP connection time-out (TCPT) units. Specifies a time interval upon which if there is no in or outbound traffic through a TCP connection, the connection will be terminated.

n=minutes (TCPT=0) or seconds (TCPT=1)

Note: This value only affects the TCP connection in TCP PAD mode.

*ENQ=*n*

Outputs an ENQ [0x05] after the TCP CONNECT delayed by the Delay Connect Response time (**S221**).

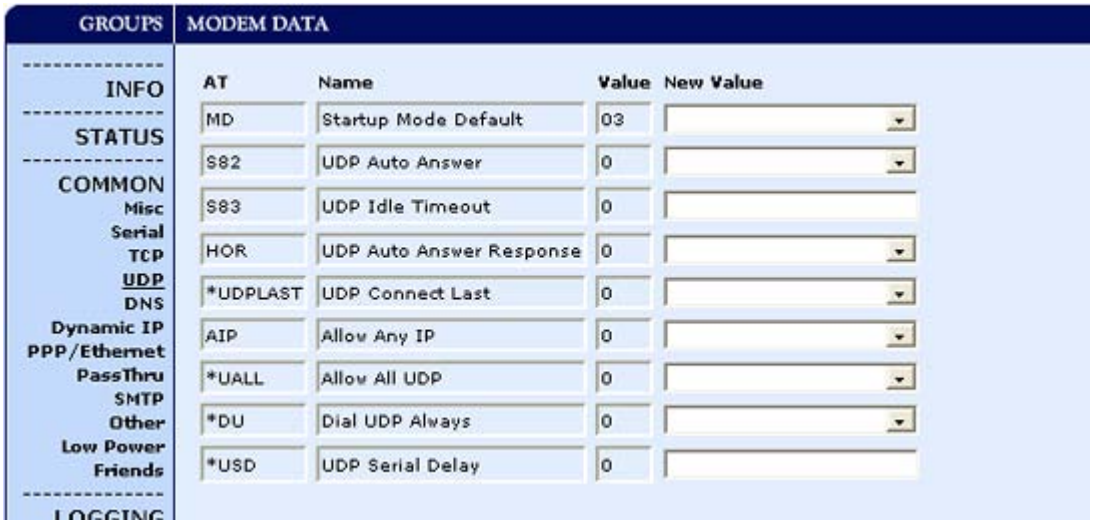
n=**0 :** Disabled (Default).

n=**1 :** Enables ENQ on CONNECT.

UDP

This group includes commands specific to UDP communications.

FIGURE 1. Common : UDP



AIP=*n*

Allow IP address.

n=**0** Allow only the IP address specified in **S53** to connect when UDP auto answer is enabled (**S82=2**).

n=**1** Allow any incoming IP address to connect when UDP auto answer is enabled (**S82=2**).

Note: Always subject to any Friends filters that may be defined.

HOR=*n*

Half-Open Response - In UDP auto answer (half-open) mode:

n=**0** No response codes when UDP session is initiated.

n=**1** RING CONNECT response codes sent out serial link before the data from the first UDP packet.

Note: Quiet Mode must be Off.

MD*hh*

Default power-up mode for the serial port.

When the Raven is power-cycled, the serial port enters the mode specified by this command after 5 seconds. On startup, typing ATMD0 within 5 seconds changes the mode to normal (AT command) mode.

hh (hex byte)=**00** : normal mode

hh=**01 :** SLIP mode

hh=**02 :** PPP mode

hh=**03 :** UDP mode

hh=**04 :** TCP mode

hh=**07 :** PassThru mode

hh=**0F :** PinPoint MDT

hh=**13 :** Modbus ASCII

hh=**23 :** Modbus RTU (Binary)

hh=**33 :** BSAP

hh=**63 :** Variable Modbus

hh=**73 :** Reliable UDP

hh=**83 :** UDP Multicast

See also **S53** to set the port for UDP or TCP.

S82=*n*

Enables UDP auto answer (half-open) mode.

n=**0 :** Normal mode

n=**2 :** Enable UDP auto answer mode.

S83=*n*

Set or query UDP auto answer idle time-out. If no data is sent or received before the time-out occurs, the current UDP session will be terminated. While a session is active, packets from other IP addresses will be discarded (unless *UALL is set).

n=**1 - 255** Time-out in seconds.

n=**0 :** No idle time-out (Default).

*DU=*n*

The dial command always uses UDP, even when using ATDT.

n=**0 :** Dial using the means specified (default).

n=**1 :** Dial UDP always, even when using ATDT.

Note: When this parameter is set you cannot establish a TCP PAD connection.

*UALL=*n*

Accepts UDP packets from any IP address when a UDP session is active. If there is no UDP session active, an incoming UDP packet will be treated according to the UDP auto answer and AIP settings.

n=**0 :** No effect (Default).

n=**1 :** Accept UDP data from all IP addresses when in a UDP session.

*UDPLAST=*n*

If enabled, sets **S53** to the last accepted IP address through UDP auto answer. This can be used in conjunction with **MD3** so that when there is no UDP session, new ethernet host data will cause a connection to be restored to the last IP accepted through UDP auto answer. .

n=**0 :** Does not change **S53** setting. (Default).

n=**1 :** Set **S53** to the last accepted IP.

Note: This does not change the **S53** setting in NVRAM. If the modem is reset, the original **S53** setting will be restored from NVRAM.

*USD=*n*

Waits the specified delay before sending the first UDP packet and the subsequent UDP packets out to the serial port.

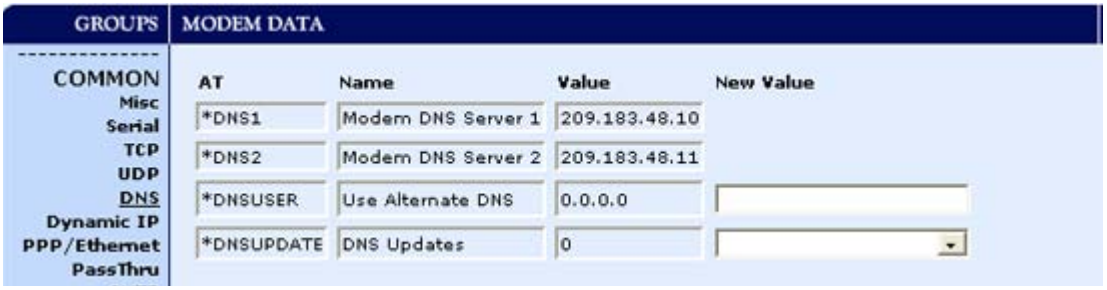
n=**1 - 255** Delay in 100ms units, from 100 ms to 25.5 sec.

n=**0 :** No UDP packet delay (Default).

DNS

This group includes commands specific to the modem being able to use domain names instead of IP addresses for other configuration options.

FIGURE 1. Common : DNS



*DNS*n*

Queries the DNS addresses. Cingular provides the DNS addresses while your modem is registring on their network.

n=**1** *or* **2** First and second DNS address.

d.d.d.d = IP of domain server

*DNSUPDATE=*n*

Indicates whether the modem should send DNS updates to the DNS server specified by *DNSUSER. These updates are as per RFC2136. They are not secure and are recommended only for a private network. In a public network, the IP Logger services should be used instead.

n=**0 :** DNS updates disabled (Default).

n=**1 :** DNS updates enabled.

*DNSUSER=*d.d.d.d*

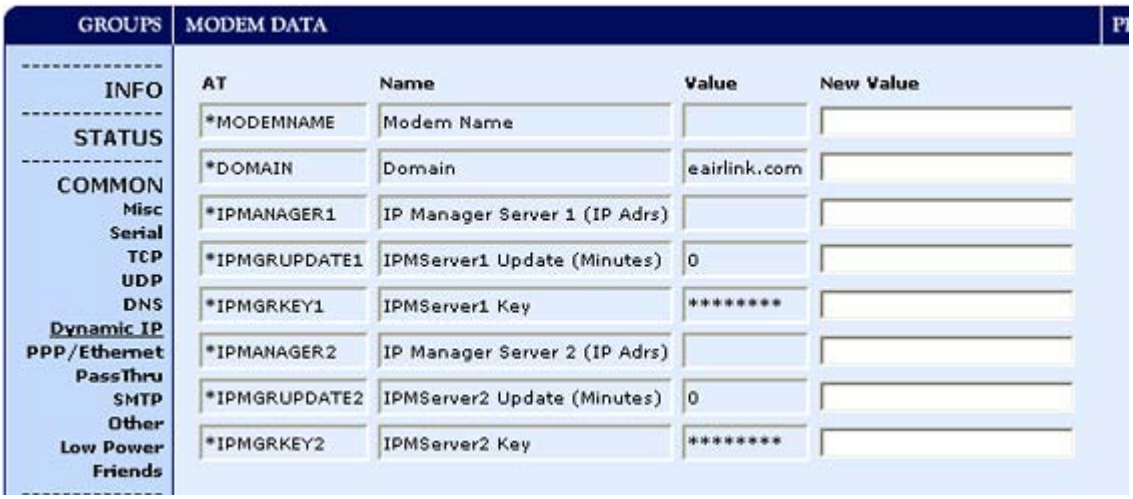
Sets a user-provided DNS to query first when performing name resolutions in the modem.

d.d.d.d = IP of domain server

Dynamic IP

This group includes commands specific to dynamic DNS. Dynamic DNS allows the Raven to use a dynamic IP (can change each time you connect) account but still allow you to use a fully qualified domain name to contact the Raven using IP Manager (page 14) running on a server with a dynamic DNS updater.

FIGURE 1. Common : Dynamic IP



DOMAIN=[name]*

Domain (or domain zone) of which the Raven is a part. This value is used during name resolutions if a fully qualified name is not provided and also for DNS updates. This value can be up to 20 characters long.

name = domain name (i.e. eairlink.com)

If ***DOMAIN=eairlink.com**, then when ATDT@remote1 is entered, the fully qualified name remote1.eairlink.com will be used to perform a DNS query to resolve the name to an IP address.

Note: Only letters, numbers, hyphens, and periods can be used in a domain name.

*IPMANAGER*n*=*[name]*

Sets a domain name or IP address to send IP change notifications to. Up to two independent IP Manager servers can be set, using either AT*IPMANAGER1 or AT*IPMANAGER2. Updates to a server can be disabled by setting that entry to nothing (for example, “AT*IPMANAGER1=”).

n=**1 :** First IP Manager server.

n=**2 :** Second IP Manager server.

name = domain name

*IPMGRKEY*n*=*[key]*

Sets the 128-bit key to use to authenticate the IP update notifications. If the key's value is all zeros, a default key will be used. If all the bytes in the key are set to FF, then no key will be used (i.e. the IP change notifications will not be authenticated). AT*IPMGRKEY1 is used to set the key to use with AT*IPMANAGER1, while AT*IPMGRKEY2 is used to the key with AT*IPMANAGER2.

n=**1 :** First IP Manager server.

n=**2 :** Second IP Manager server.

key=128-bit key in hexadecimal [32 hex characters]

*IPMGRUPDATE*n*=*m*

Sets the number of minutes to periodically send an IP update notification to the corresponding server. This will occur even if the IP address of the Raven doesn't change. *IPMGRUPDATE1 is used to set the refresh rate to *IPMANAGER1, while *IPMGRUPDATE2 is used with *IPMANAGER2.

n=**1 :** First IP Manager server.

n=**2 :** Second IP Manager server.

m=0, 5-255 Number of minutes to send an update.

If the value is set to 0, then periodic updates will not be issued (i.e. IP change notifications will only be sent when the IP actually changes).

MODEMNAME=[name]*

Name of the Raven (up to 20 characters long) to use when performing IP address change notifications to IP Manager. The value in *DOMAIN provides the domain zone to add to this name.

name = domain name (i.e. eairlink.com)

Example: if ***MODEMNAME=mymodem** and ***DOMAIN=eairlink.com**, then the modem's fully qualified domain name is **mymodem.eairlink.com**.

Automatically Generated Names:

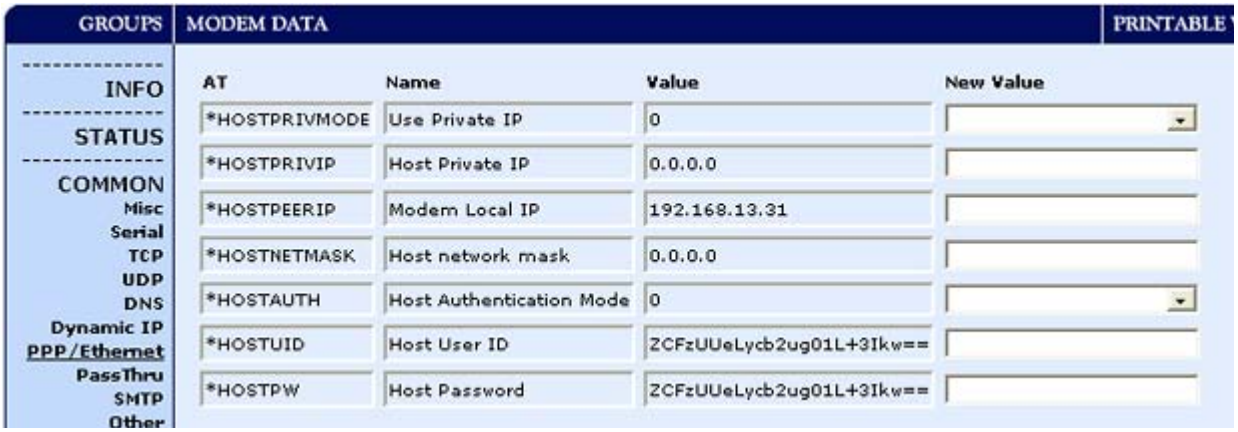
- **#I3** - The ESN/IMEI will be used as the name.
- **#NETPHONE** - The phone number will be used as the name.

Note: Each modem using IP Manager needs a unique name. Two modems cannot be called “mymodem”. One could be “mymodem1” with the other as “mymodem”.

PPP/Ethernet

This group includes commands specific to PPP or Ethernet connections between the Raven and a connected device.

FIGURE 1. Common : PPP/Ethernet



*HOSTAUTH=*n*

Host Authentication Mode: Use PAP or CHAP to request the user login and password during PPP or CHAP negotiation on the host connection. The username and password set in *HOSTUID and *HOSTPW will be used.

n=**0 :** Disable PAP or CHAP request (Default).

n=**1 :** PAP and CHAP.

n=**2 :** CHAP

*HOSTNETMASK=*n.n.n.n*

Subnet mask for the host interface. Allows communication with a subnet behind the host interface.

n.n.n.n = subnet mask, example 255.255.255.0

*HOSTPEERIP=*d.d.d.d*

Set or query the IP address that can be used to directly contact the Raven once a EDGE/GPRS connection is established. If this value is not specified, 192.168.13.31 will be used.

d.d.d.d=local or peer IP of modem

Note: This is not normally used nor needed by user applications.

*HOSTPRIVIP=*d.d.d.d*

Set or query the private IP address that is to be negotiated by the EDGE/GPRS connection if *HOSTPRIVMODE =1.

d.d.d.d=IP Address

*HOSTPRIVMODE=*n*

Set or query whether a private or public (network) IP is to be used when the Host initiates a EDGE/GPRS connection to the modem.

n=**0 :** Public (network) IP Mode: When the Host initiates a PPP connection, the host will be given the network IP address that was obtained from Cingular while registering on the network. If the network issues a new IP address, the EDGE/GPRS connection will be closed (since the IP address has changed) and has to be re-initiated. (default).

n=**1 :** Private IP Mode: When the Host initiates a EDGE/GPRS connection, the host will be given the IP address specified in *HOSTPRIVIP. The modem will then perform 1 to 1 NAT-like address translation, which shields the Host from network IP changes.

*HOSTPW=*string*

Host Password forPAP or CHAP.

string=password

*HOSTUID=*string*

Host User ID forPAP or CHAP.

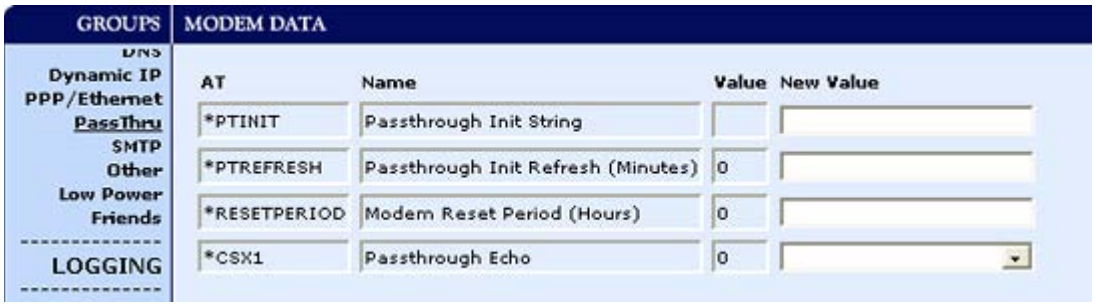
string=user id (up to 64 bytes)

PassThru

PassThru Mode is used to communicate directly to the Raven's internal hardware.

Caution: While the modem is in PassThru mode, ALEOS is disabled. If you need to connect to the Raven while it is in PassThru mode, you will need to do so with a terminal application. Not all commands are available while the modem is in PassThru mode.

FIGURE 1. Common : PassThru



*CSX1=*n*

n=**0 :** Data will be passed to the host.

n=**1 :** PASSTHRU mode will echo all host received data and will not pass the data to the modem while the modem is not asserting DCD.

Note: If the modem is asserting DCD, data will be passed from the host to the modem as it normally is when ***CSX1=0**.

*PTINIT=*string*

Any AT Command string to be passed to the OEM module before entering PASSTHRU mode, e.g. AT&S1V1, etc.

string=AT command(s)

*PTREFRESH=*n*

Number of minutes of inactivity in PASSTHRU mode to resend the *PTINIT string to the hardware module.

n=**1-255** minutes

n=**0 :** Disabled

*RESETPERIOD=*n*

In PASSTHRU mode, modem will be reset after this period if no data has been sent or received. Value is in hours.

n=**1-255** hours

n=**0 :** Disabled

\APASSTHRU

Caution: This mode is not available through the remote AT telnet server. You will need to connect to the Raven with it connected directly to your computer.

Sets the modem operation to pass through mode. This mode will pass any characters received on the serial port directly to the internal hardware module and output any characters from the internal hardware module out the serial port. This allows direct access/configuration of the hardware module. Once this mode is entered, the unit must be physically reset to return to normal operation.

This command is not available in Wireless Ace.

Note: It may take up to 30 seconds for the hardware module to respond after CONNECT is output.

SMTP (including SMS)

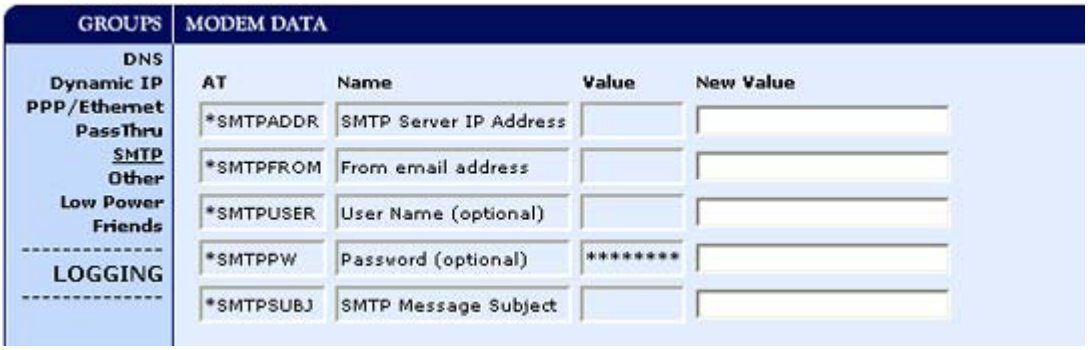
This group includes commands specific to messaging.

SMTP (Simple Mail Transfer Protocol) is the de facto standard for email transmission across the Internet. The Raven can send messages using SMTP if it has been configured to use a mail server.

SMS (Short Message Service) is another way to send messages via Cingular's cellular network.

Caution: Your account with Cingular may not support message sending with SMS. For most SMS commands (those not proceeded by *), you will need to have the modem in PassThru mode.

FIGURE 1. Common : SMTP



SMTPADDR=[d.d.d.d][name][nom]*

Specify the IP address or Fully Qualified Domain Name (FQDN) of the SMTP server to use.

d.d.d.d=IP Address

name=domain name

Maximum: 40 characters.

*SMTPFROM=*email*

Sets the email address from which the SMTP message is being sent.

email= email address

Maximum: 30 characters.

*SMTPPW=*password*

Sets the password to use when authenticating the email account (*SMTPFROM) with the server (*SMTPADDR).

pass= password

Note: Not required to use SMTP settings but may be required by Cingular.

*SMTPSUBJ=*subject*

Allows configuration of the default Subject to use if one isn't specified in the message by providing a "Subject: xxx" line as the initial message line.

subject= SMTP message subject

*SMTPUSER=*user*

The email account username to authenticate with the SMTP server (*SMTPADDR) for sending email.

user= username

Maximum: 40 characters.

Note: Not required to use SMTP settings but may be required by Cingular.

Messaging related AT Commands not Available through Wireless Ace

*NETSMS2EMAIL=*n*

Specify the SMS/E-mail server number. This maybe necessary to send an SMS message to an email address .

n=SMS/E-mail server

SMTPSEND=[email][body]*

Sends an email to the address specified, followed by the body of the email message.

email= email address

body= message body

The email message is terminated and sent by entering a **.** or **Ctrl-Z** on an empty line.

See also *SMTPSUBJ, *SMYPFROM, and *SMTPADDR.

*SMTPSTATUS?

Returns the status of the last issued SMTP message (*SMTPSEND). If no status is available **0** is returned. Once read, the status is cleared out.

The status codes returned come from the SMTP server to which that the modem sent the request. Unless the receiving server is not standard, they follow the RFC for SMTP.

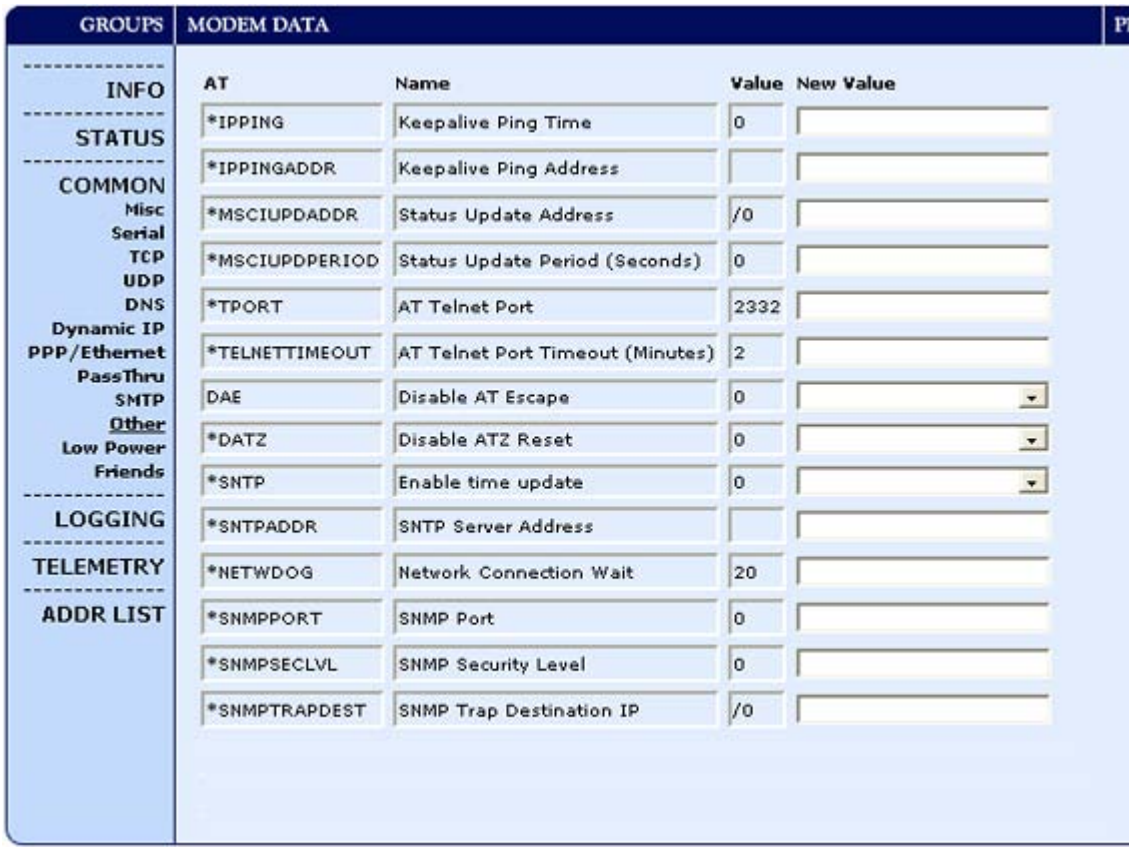
Example: 354 = send in progress, 250 = sent ok.

Other

The commands in this group are not specific to the other group categories.

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem.

FIGURE 1. Common : Other



DAE=*n*

Disable AT Escape Sequence detection.

n=**0 :** Enable +++ AT escape sequence detection.

n=**1 :** Disable +++ AT escape sequence detection.

*DATZ=*n*

Enables or disables reset on ATZ.

n=**0 :** Normal Reset (Default)

n=**1 :** Disable Reset on ATZ

IPPING=n*

Set the period to ping (if no valid packets have been received) a specified address (*IPPINGADDR) to keep the modem alive (online).

n=15-255 minutes

n=**0 :** Disable pinging (default)

15 minutes is the minimum interval which can be set for Keepalive.

See also *MINXMIT which can override this value.

IPPINGADDR=[d.d.d.d][name]*

Set the IP address or valid internet domain name for the Raven to ping to keep itself alive (online). *IPPING must to be set to a value other than 0 to enable pinging.

d.d.d.d=IP address

name= domain name

MSCIUPDADDR=name[/port]*

Modem Status Update Address - where Name/Port is the domain name and port of the machine where the modem status updates will be sent. The Raven's status parameters are sent in an XML format.

name=domain name

port=port

MSCIUPDPERIOD=n*

Modem Status Update Period - where n defines the update period in seconds.

n=1-255 seconds

n=**0 :** Disabled.

NETWDOG=n*

Network connection watchdog: The number of minutes to wait for a network connection. If no connection is established within the set number of minutes, the Raven resets.

n=minutes Default = 20 min.

n=**0 :** Disabled.

SNMPCOMMUNITY=n*

The SNMP Community String acts like a password to limit access to the modem's SNMP data.

n=a string of no more than 20 characters (default = public).

SNMPPORT=n*

This controls which port the SNMP Agent listens on.

n=1-65535

n=**0 :** SNMP is disabled.

*SNMPSECLVL=*n*

Selects the security level requirements for SNMP communications as follows:

n=**0 :** No security required. SNMPv2c and SNMPv3 communications are allowed.

n=**1 :** Authentication equivalent to “authNoPriv” setting in SNMPv3. SNMPv3 is required to do authentication, SNMPv2c transmissions will be silently discarded.

n=**2 :** Authentication and encryption, equivalent to “authPriv”' setting in SNMPv3. SNMPv3 is required to do authentication and encryption, SNMPv2c and SNMPv3 authNoPriv transmissions will be silently discarded. Messages are both authenticated and encrypted to prevent a hacker from viewing its contents.

*SNMPTRAPDEST=*host/[port]*

Controls destination for SNMP Trap messages.

host=IP address

port=TCP port

If port is 0 or host is empty, traps are disabled.

Traps are sent out according to the SNMP security level (i.e. if the security level is 2, traps will be authenticated and encrypted). Currently, the only trap that can be generated is linkup.

*SNTP=*n*

Enables daily SNTP update of the system time.

n=**0 :** Off

n=**1 :** On

SNTPADDR=[d.d.d.d][name]*

SNTP Server IP address, or fully-qualified domain name, to use if *SNTP=1.

d.d.d.d=IP

name=domain name

If blank, **time.nist.gov** is used.

*TELNETTIMEOUT=*n*

Telnet port inactivity time out.

n=minutes

By default, this value is set to close the AT telnet connection if no data is received for 2 minutes.

*TPORT=*n*

Sets or queries the port used for the AT Telnet server. If 0 is specified, the AT Telnet server will be disabled. The default value is **2332**. .

n=1-65535

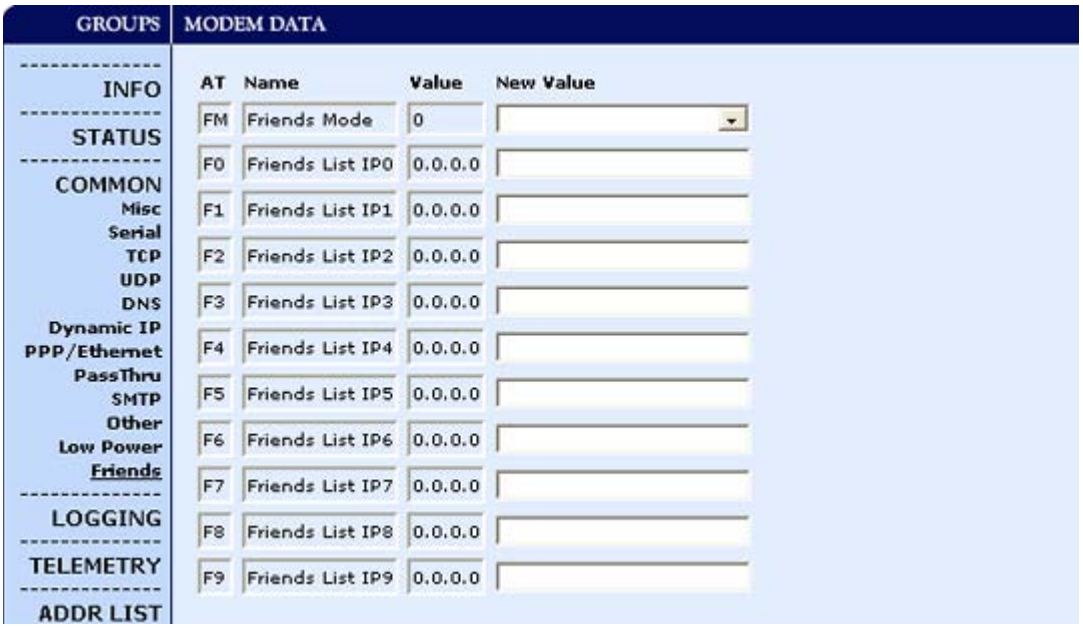
n=**0 :** Disabled.

Friends

Friends Mode can limit access to the Raven from Cingular's network and the Internet. Friends Mode is a limited form of security, a basic firewall.

Note: Friends mode does not block any traffic from the cellular network, wanted or not. Friends Mode will only prevent the Raven from forwarding data from those not on the Friends List. It does not prevent data from traversing the network to the modem which is still billable traffic.

FIGURE 1. Common : Friends



FM=*n*

Friends Mode - Only allow specified IPs to access the Raven.

n=**0 :** Disable Friends mode

n=**1 :** Enable Friends mode - Only packets from friends will be accepted (see below); packets from other IP addresses are ignored.

Fn=*[d.d.d.d]*

Friends mode IP address.

n=**0 - 9** Friends list index .

d.d.d.d =IP address

255 = allow any number 0-255

Example: 166.129.2.255 allows access by all IPs in the range 166.129.2.0-166.129.2.255.

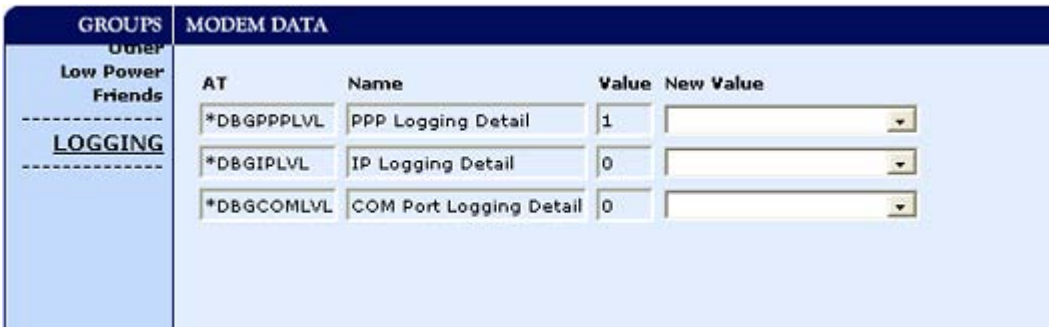
ATF? will return a list of all the current F*n* settings.

Logging

This group includes commands specific to the internal log.

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem.

FIGURE 1. Logging



*DBGCOMMLVL=*n*

Set the logging level for the host or module COM port.

n=**0 :** No logging

n=**1 :** Host COM

n=**2 :** Module COM

*DBGIPLVL=*n*

Sets the logging level for the IP subsystem.

n=**0 :** No logging

n=**1 :** Log errors (i.e. invalid/corrupt packets, etc.).

n=**2 :** Log the header of all received packets. Note that this can quickly exhaust available space for the event log.

n=**3 :** Log the header of all received and sent packets. Note that this can quickly exhaust available space for the event log.

*DBGPPPLVL=*n*

Sets the logging level for the PPP stack.

Enables logging at different levels of detail.

n=**0 :** No logging

n=**1 :** Log client events (default)

n=**2 :** Log server events

n=**3 :** Log client and Server events

Telemetry and Addr List (Address List)

Modbus, commonly used with telemetry devices, allows a connection via serial port to the modem (page 31). Telemetry and Addr List commands are only used when the modem is in one of the Modbus start-up modes.

FIGURE 1. Telemetry

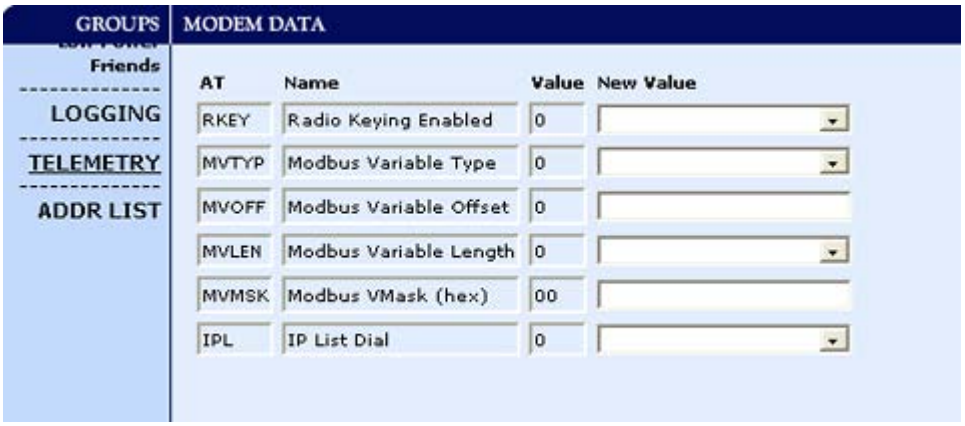


FIGURE 2. Addr List (detail)

FIGURE 3. Addr List

IPL=*n*

IP List Dial

This allows access the Modbus IP list using the first two digits of the dial string. Example: ATDT1234567 would go to ID "12" on the Modbus list and use the associated IP as the destination.

n=**0 :** Disabled

n=**1 :** Enabled

MLIST*id*=*d.d.d.d*

This command is configured by the fields avaialble in the Addr List group.

Enters an ID and IP address into the Modbus List. ID is a decimal value (1 to 100).

id=ID

d.d.d.d=IP or name adresse

MLISTX*hexid*=*d.d.d.d*

This command is configured by the fields avaialble in the Addr List group.

Enters an ID and IP address into the Modbus List. ID is a hexadecimal value (0 to 64).

hexid=ID

d.d.d.d=IP or name adresse

MVLEN=*n*

Modbus Variant ID Length: Length of the RTU ID in a modbus-variant protocol, in bytes.

***n*=1** This parameter is used to define the length of the RTU ID in Modbus-like protocol data packets.

***n*=2** This parameter is used when the when the **MD** is set to hex 63.

MVMSK=*hh*

Modbus Variant ID Mask: Byte hex mask to use when extracting the ID. Specify which bits in the ID field to use. This parameter is used when the when the Mode Default (MD) is set to hex 63.

hh=hex value **00 -** no mask, all 8 bits (default)

0F - only the low order 4 bits

MVOFF=*n*

Modbus (variable mode) Offset : Indicates the offset in the data of where the Modbus ID starts.

***n*= 0 - 255**

MVOPT=*n*

Modbus Variant Option: Sets various behavioral options when dealing with a Modbus-variant protocol. This parameter is used when the when **MD** is set to hex 63.

n=**0 :** No special action (Default).

n=**1 :** Skip leading zeroes in Modbus packets.

Cannot be configured in Wireless Ace.

MVTYP=*n*

Modbus Variant Type: The data-type of the RTU ID in a modbus-variant protocol. This parameter is used to define the data-type of the RTU ID in Modbus-like protocol data packets. This parameter is used when **MD** is set to 63.

n=**0 :** Binary (Default)

n=**1 :** ASCII Hex

n=**2 :** ASCII Decimal

RKEY=*n*

Radio Transceiver Keying.

n=**0 :** Off (Default)

n=**1 :** On

Enable/disable MDS Radio transceiver keying. Radio keying is designed to assert CTS when a packet is received, delay the time as specified, send the data out the serial port, wait the same amount time, drop CTS. This way, the CTS signal can be used to key a transmitter on and give it time to reach its power level before data is sent to it. Delay interval is specified in **S221**.

Commands in other groups associtated with Telemetry

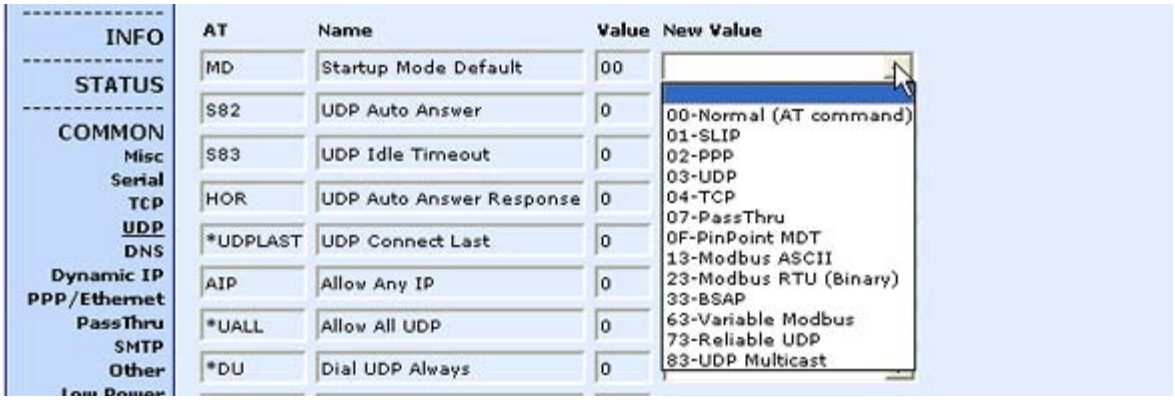
Only the settings associated with telemetry are explained in this section.

MD*n*

This command can be found in the **UDP** group.

Set to the appropriate start up mode for your telemetry configuration.

FIGURE 4. MD menu



***n*=03 :** UDP

***n*=13 :** Modbus ASCII

***n*=23 :** Modbus RTU

***n*=33 :** BSAP

***n*=63 :** Variable Modbus

***n*=73 :** Reliable UDP

***n*=83 :** UDP Multicast

S53=[*method*][*d.d.d.d*][/*ppppp*] and *DPORT=*n*

These commands are in the **Misc** group.

FIGURE 5. S53 and *DPORT

Destination Address

For the remote Ravens, set the destination address to the IP address or domain name (if you are using IP Manager with a dynamic IP) of the host Raven.

*Destination Port and *DPORT*

The destination port (**S53**) for the Raven at the host needs to match the device port in use on all the Ravens at the remote sites (***DPORT**), and the destination port (**S53**) for all the Ravens at the remote sites need to match the device port in use on the Ravens at the host (***DPORT**).

EDGE/HSDPA

This group includes commands specific to EDGE and GPRS.

The commands displayed in Wireless Ace and the results of those commands depends on the model of the modem.

FIGURE 1. EDGE/HSDPA

*NETAPN=*apn*

Easy entry of the APN.

apn=access

If left blank, the modem will attempt to use the default subscriber value as defined by the account.

+CGQMIN

Minimum Acceptable Quality of Service Profile.

Change should be at carrier's request. Normally not required to be changed.

+CGQREQ

Set Quality of Service Profile.

Change should be at carrier's request. Normally not required to be changed.

+COPS=*mode,[format][,oper]*

Manually specify an operator. Refer also to ***NETOP**.

mode=**0 :** Automatic - any affiliated carrier [default].

mode=**1 :** Manual - use only the operator <oper> specified.

mode=**4 :** Manual/Automatic - if manual selection fails, goes to automatic mode.

format=**0 :** Alphanumeric ("name") (G3210 must use this format).

format=**2 :** Numeric

oper=”name”

APPENDIX 3

Windows Dial-up Networking (DUN)

Dial-up Networking (DUN) allows a computer or other device to use the serial port on your Raven to connect to the Internet or private network using PPP just like an analog modem using a standard phone line.

Note: The Setup Wizard is the preferred method to install a modem driver and configure PPP for your modem. Use the instructions here only if you do not have the Setup Wizard available.

Using the Setup Wizard, if do not need to activate your modem, you can select just Setup a DUN Connection from the opening menu to install the driver and set up DUN. Follow the instructions in the Quick Start Guide to install DUN with the Setup Wizard.

Microsoft Windows XP is used in the examples below. The modem driver installation and DUN setup and configuration is similar in Microsoft Windows 2000. Examples are not provided here for installing the driver or configuring DUN for any other operating system.

Caution: To install any driver on your computer, you may need to be logged in as Administrator or have Administrator privileges for your login.

Installing the Modem Driver in Microsoft Windows

Standard installations of Microsoft Windows XP and 2000 include a generic modem driver which will work with your Raven.

1. Connect the Raven.

   a. Connect the modem to the computer with the DB-9 cable.

   b. Plug in the AC adapter, connect the antenna(s) and power on the modem.

2. Install the driver.

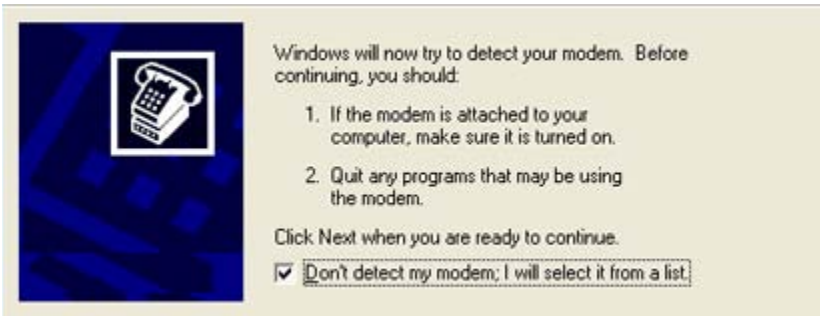
   a. Select **Start > Control Panel > Phone and Modem Options** (in Classic View).

FIGURE 1. Phone and Modem Options

b.In the Phone And Modem Options dialog box. Select the **Modems** tab. Select **Add**.

FIGURE 2. Modems

FIGURE 3. Install New Modem

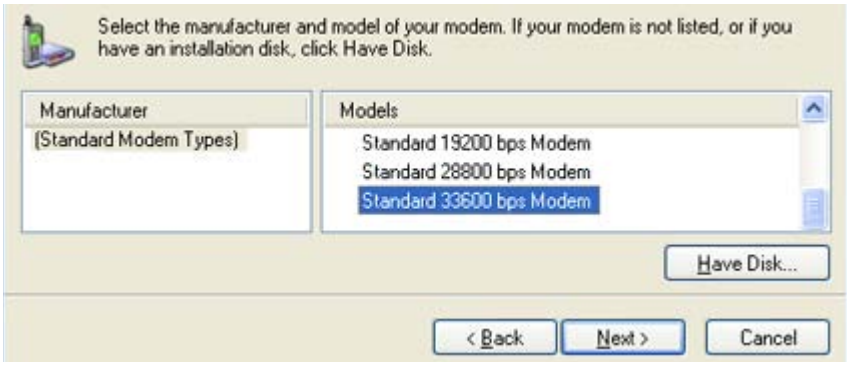

Windows will now try to detect your modem. Before continuing, you should:
1. If the modem is attached to your computer, make sure it is turned on.
2. Quit any programs that may be using the modem.
Click Next when you are ready to continue.
Don't detect my modem; I will select it from a list.

c. Check **Don't detect my modem; I will select it from a list** and select **Next**.

d. Select **(Standard Modem Types)** from the Manufacturers column, select **Standard 33600 bps Modem** from the Models column, and select **Next**.

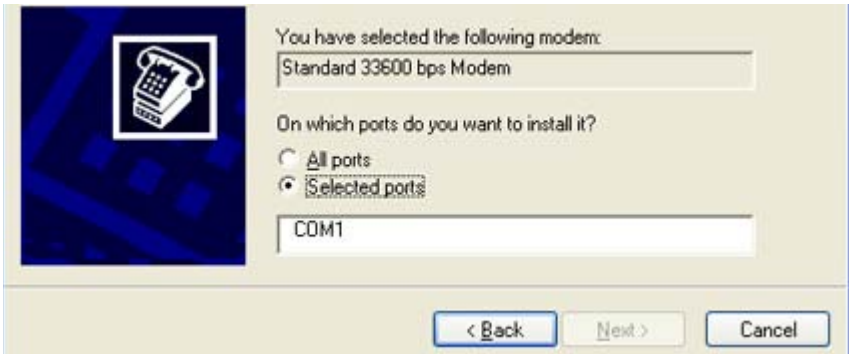
Note: If you have the speed for your modem configured as something other than the default, use the Standard Modem that matches the speed you configured.

FIGURE 4. Modem Driver


Select the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.
Manufacturer
(Standard Modem Types)
Models
Standard 19200 bps Modem
Standard 28800 bps Modem
Standard 33600 bps Modem
Have Disk...
< Back
Next >
Cancel

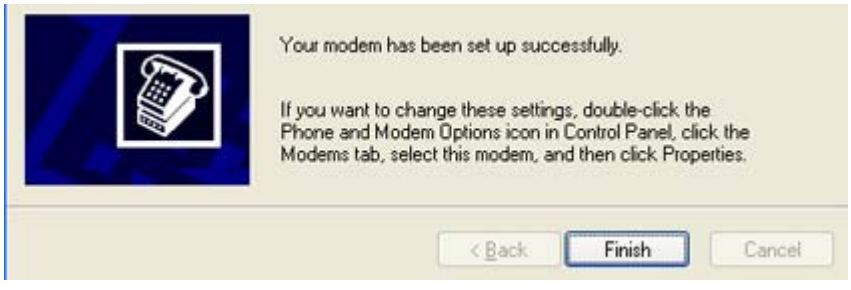
e. Check **Selected Ports**, select the COM port the modem is connected to (commonly COM1), and select **Next**.

FIGURE 5. Modem Port



f. Once the modem driver is installed, select **Finish**.

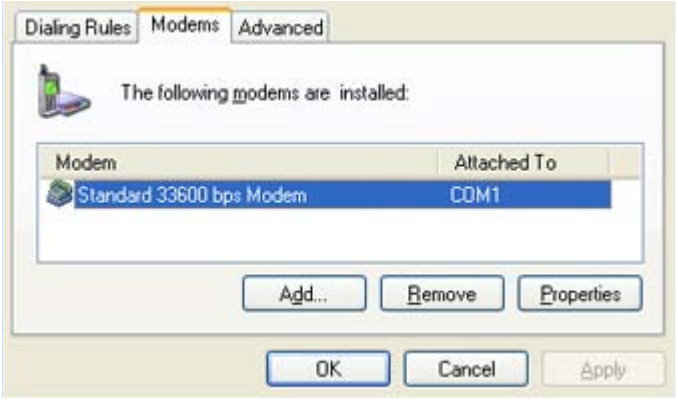
FIGURE 6. Finish


Your modem has been set up successfully.
If you want to change these settings, double-click the Phone and Modem Options icon in Control Panel, click the Modems tab, select this modem, and then click Properties.
< Back
Finish
Cancel

3. Configure the driver.

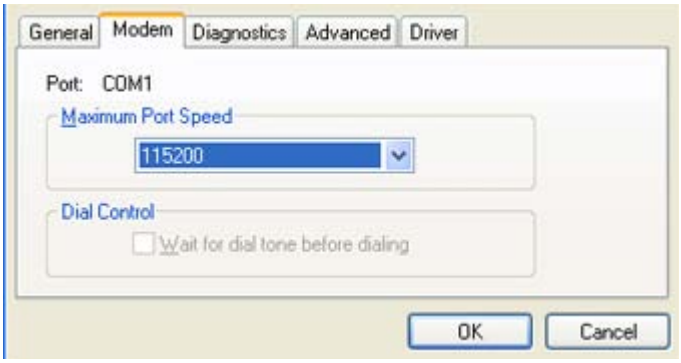
a. When you return to the Phone and Modem Options window, you should see the newly installed modem "attached to" the correct COM port. Highlight the modem and select **Properties**.

FIGURE 7. Modems



b. Select the **Modem** tab. **Maximum Port Speed** should be set to **115200** (default). Select **OK** to exit.

FIGURE 8. Setting Maximum Port Speed Maximum Port Speed



c. Select **OK** again to exit out of the Phone and Modem Options.

Dial-Up Networking (PPP) Configuration for Microsoft Windows

Once you have a driver for the modem installed on your computer, you can set up and configure Dial Up Networking (DUN) to use the modem as your connection to the Internet using PPP.

Before you start, you will need:

- Administrator privileges to the computer you are configuring or access granted by an administrator on the network to add/remove devices to your computer. (Not necessary on Windows 98/ME.)
- A wireless user account, password, and access number (obtained from Cingular). *May not be required.*
- Windows COM Port and modem set up for a Standard 33600 Modem (see previous section).
- No other program running on your computer that is using the same COM port (serial port) configured for your modem.

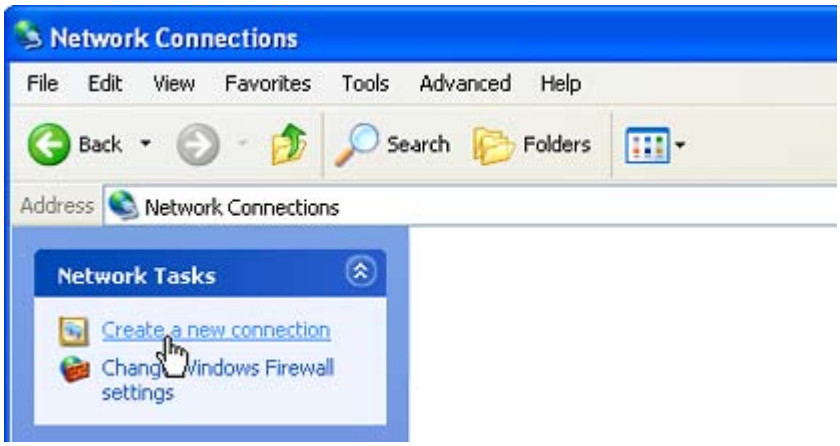
Caution: If you have an existing LAN connection, installing DUN for the modem may interfere with the LAN connection. It's recommended to disconnect your LAN connection before using a PPP connection with your Raven.

Once the DUN connection is initiated, by default, it will take over as the "default route" for network communication and specifically for Internet access. If you want the two connections to co-exist, you will need to de-select "Use default gateway on remote network" (described later) and use the route command in Windows to setup routing through the modem properly. This guide does not provide information on the route command. You may need to consult with your network administrator to properly configure routing.

1. Create a new network connection.

a. Select **Start > Connect > To Show All Connections** to open the **Network Connections** window.

FIGURE 9. Network Connections



b. Select **Create a New Connection** under ***Network Tasks*** in the menu area on the left. Select **Next** to start installing and configuring the DUN connection.

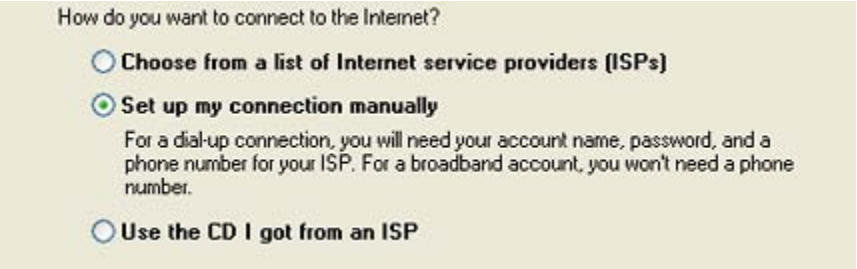
c. Select **Connect to the Internet** and then select **Next**.

FIGURE 10. Connection Type

Connect to the Internet
Connect to the Internet so you can browse the Web and read email.
Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.
Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.

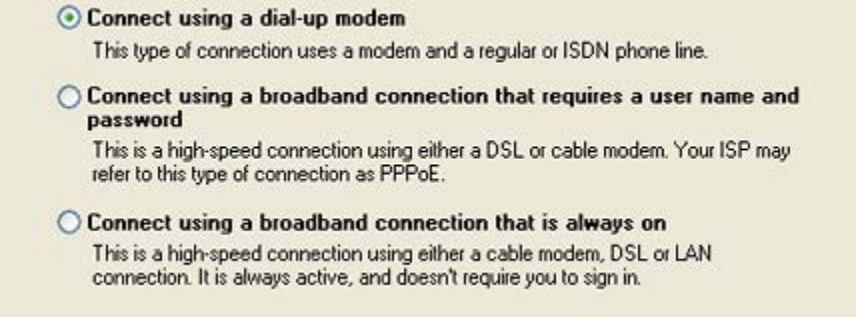
d. Select **Set up my connection manually** and then select **Next**.

FIGURE 11. Preparing the Internet Connection


How do you want to connect to the Internet?
Choose from a list of Internet service providers (ISPs)
Set up my connection manually
For a dial-up connection, you will need your account name, password, and a phone number for your ISP. For a broadband account, you won't need a phone number.
Use the CD I got from an ISP

e. Select **Connect using a dial-up modem** and select **Next**.

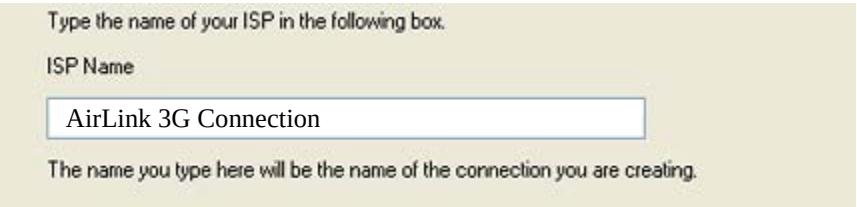
FIGURE 12. Internet Connection


Connect using a dial-up modem
This type of connection uses a modem and a regular or ISDN phone line.
Connect using a broadband connection that requires a user name and password
This is a high-speed connection using either a DSL or cable modem. Your ISP may refer to this type of connection as PPPoE.
Connect using a broadband connection that is always on
This is a high-speed connection using either a cable modem, DSL or LAN connection. It is always active, and doesn't require you to sign in.

f. Type in a name for the connection, such as **AirLink 3G Connection**. Select **Next**.

The name provided here will not effect the connection in any way. It is only a label for the icon. It can be the name of your wireless service provider (Cingular), your modem (Raven), or any other designation for the connection.

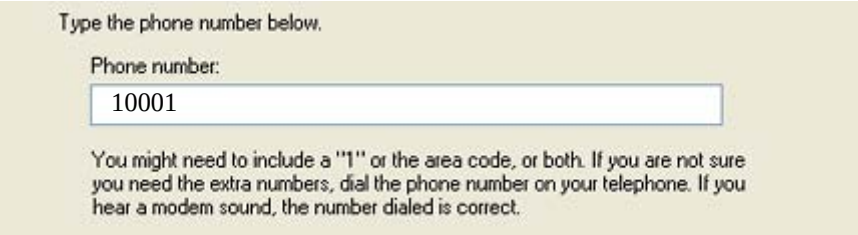
FIGURE 13. Connection Name


Type the name of your ISP in the following box.
ISP Name
AirLink 3G Connection
The name you type here will be the name of the connection you are creating.

Optional: If you have multiple modems installed on your computer, you may be prompted to select the modem to be used. Check **Standard 33600 bps Modem** and select **Next**. If you only have one modem installed, this option will be omitted.

g. Type in as the phone number for the modem to dial and select **Next**.

FIGURE 14. Phone Number

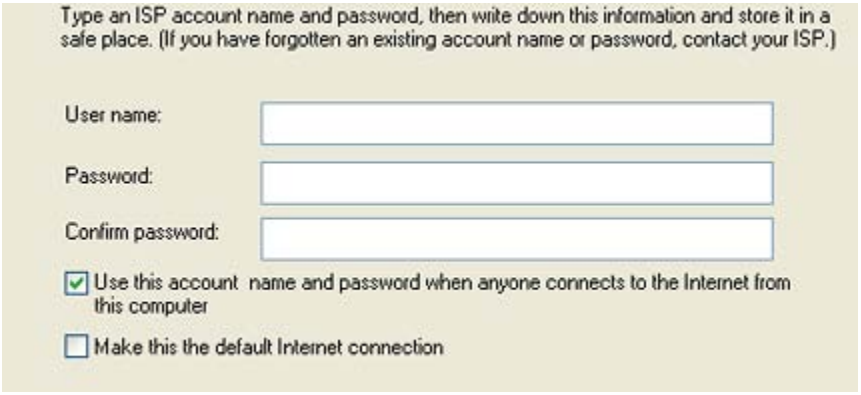

Type the phone number below.
Phone number:
10001
You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.

Optional: If you have multiple users configured for your computer, you may be prompted for *Connection Availability.* If you select **My use only**, the account currently logged on will be the only one able to use this DUN connection.

h. Generally the modem takes care of the Account Information (User name and Password) for the connection, so you can leave these fields blank (unless otherwise instructed by Support). If you want to allow others to use the same login for the modem, select **Use this account name and password...** Select **Next** to continue.

Caution: If you have a LAN connection to the Internet and select **Make this the default Internet Connection for the DUN configuration**, you will not be able to use the LAN to connect to the Internet and may also affect the network connection on your computer to the rest of the LAN. Select this option ONLY if the Raven will be your sole network connection.

FIGURE 15. Account Information


Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)
User name:
Password:
Confirm password:
Use this account name and password when anyone connects to the Internet from this computer
Make this the default Internet connection

i. If you want to add a shortcut for this DUN connection to your desktop, check **Add a shortcut...** Select **Finish** to exit the ***Network Connection Wizard***.

FIGURE 16. **Finish**

New Connection Wizard
Completing the New Connection Wizard
You have successfully completed the steps needed to create the following connection:
Airlink Modem
• Share with all users of this computer
• Use the same user name & password for everyone
The connection will be saved in the Network Connections folder.
Add a shortcut to this connection to my desktop
To create the connection and close this wizard, click Finish.
< Back
Finish
Cancel

2. Configure the connection.

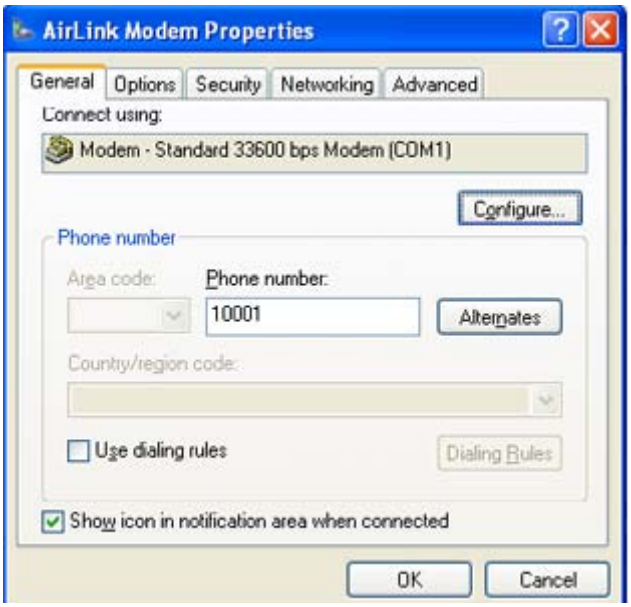
After you complete the New Connection Wizard, there are a few more things you will want to configure in the connection.

a. When the ***Connect*** window opens, select **Properties**.

FIGURE 17. **Connect**

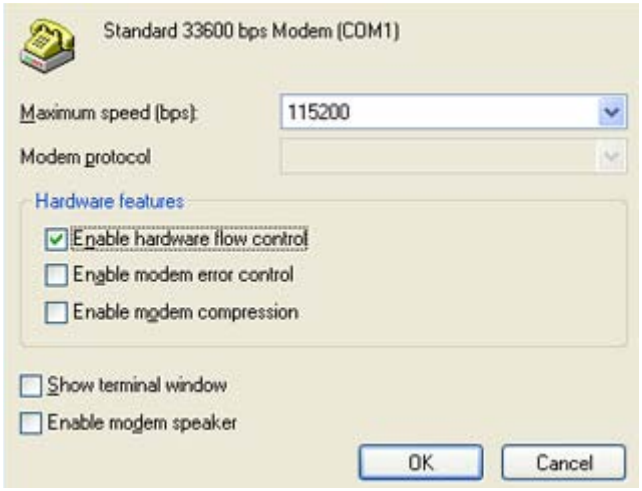
b. Uncheck **Use dialing rules**. Select **Configure**, below the ***Connect using*** line.

FIGURE 18. Modem Properties



c. Select **115200** as the ***Maximum speed***. Check **Enable hardware flow control**. Do not check any other option. Select **OK**.

FIGURE 19. Modem Configuration

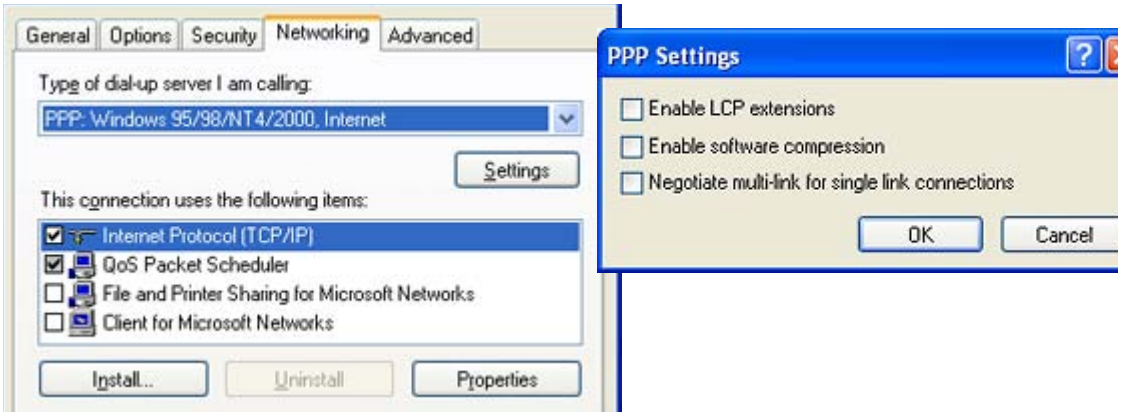


Optional: You may want to check the **Options** tab and change the settings for applications you might be using. The default options are generally applicable for most uses.

d. Unless specifically directed to do so by Support or your network administrator, you do not need to make any changes to the options on the **Security** tab.

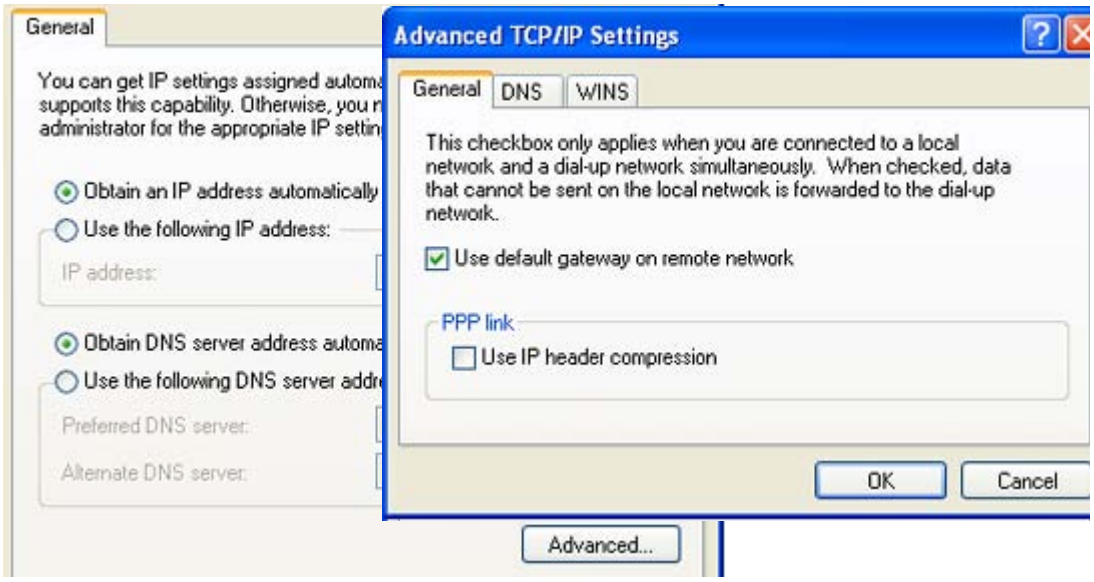
e. Select **Network**. Select **Settings**. Remove the checks from all three PPP settings. Select **OK**.

FIGURE 20. Connection Properties - PPP Settings



f. Select (highlight) **Internet Protocol (TCP/IP)** and then select **Properties**. For most configurations, you will be obtaining the IP address and the DNS server address automatically. Select **Advanced**. Uncheck **Use IP header compression**. Check **Use default gateway...** Select **OK**.

FIGURE 21. Internet Protocol


General
You can get IP settings assigned automa
supports this capability. Otherwise, you n
administrator for the appropriate IP settin
Obtain an IP address automatically
Use the following IP address:
IP address:
Obtain DNS server address automa
Use the following DNS server addr
Preferred DNS server:
Alternate DNS server:
Advanced...
Advanced TCP/IP Settings
General
DNS
WINS
This checkbox only applies when you are connected to a local network and a dial-up network simultaneously. When checked, data that cannot be sent on the local network is forwarded to the dial-up network.
Use default gateway on remote network
PPP link
Use IP header compression
OK
Cancel

g. Select **OK** and **OK** again to return to the ***Connect*** window.

Making a DUN Connection

Establishing a DUN Connection using AceView

This guide assumes you have a default installation of AceView.

1. Start AceView.
   Start > All Programs > AirLink Communications > AceView

2. Right-click on the AceView window to open the menu and select **Connection Settings**.

FIGURE 22. AceView: Menu

a. Select **Auto Start** in the DUN section.

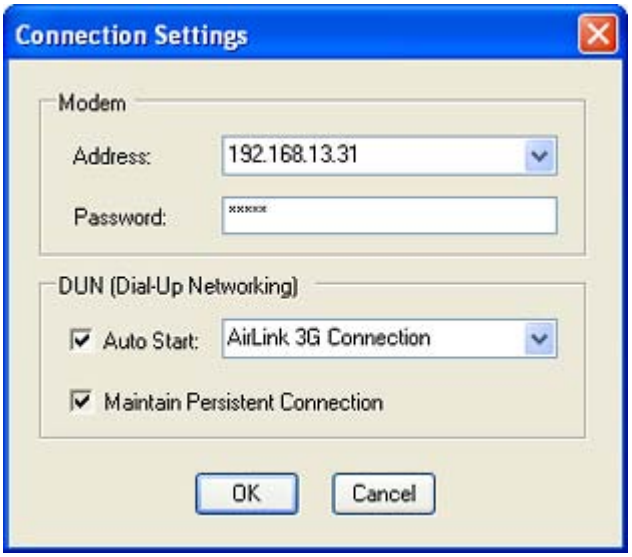
b. Select the DUN connection you have already installed on your computer from the drop down menu once you select Auto Start (you may only have 1 selection which would be preselected for you).

Note: When using the DUN connection, make sure the IP Address is set to the local IP address of the modem.

c. Select **Maintain Persistent Connection:** When checked, AceView will continually check the DUN connection to ensure it is not down. If so, AceView will attempt to connect again.

d. Click **OK**.

FIGURE 23. AceView: Connection Settings



AceView's window will show the dynamically updated status of your connection to Cingular as well the status of the connection between your computer and your Raven. .

Windows 98 and Windows NT

The direct DUN connection features of AceView are not available in Windows 98 or Windows NT.

Establishing a DUN Connection with Windows Networking

1. Start the DUN session.

Start > Connect To > AirLink 3G Connection (or whatever you named the connection).

FIGURE 24. MS Windows XP: Connect

For some accounts, you need to enter the **User name** and **Password** provided by Cingular for the cellular account.

You can also enter these parameters beforehand using ***NETUID** and ***NETPW** (refer to the AT Commands, page 50).

2. Connect to the network.

Select **Dial** to connect to the modem and the cellular network. When you're connected, an icon should appear in the system tray showing the connection status.

FIGURE 25. MS Windows XP: Connect

Note: The speed shown in the connection is the speed between the modem and your computer, it is not the speed of the modem's connection to the Carrier or the Internet.

APPENDIX 4

Simple Network Management Protocol (SNMP)

The Raven can be configured as an SNMP agent and supports SNMPv2c and SNMPv3.

SNMP Overview

The Simple Network Management Protocol (SNMP) was designed to allow remote management and monitoring of a variety of devices from a central location. The SNMP management system is generally composed of agents (such as your Raven, a router, a UPS, a web server, a file server, or other computer equipment) and a Network Management Station (NMS) which monitors all the agents on a specific network. Using the management information base (MIB), an NMS can include reporting, network topology mapping, tools to allow traffic monitoring and trend analysis, and device monitoring.

Authentication ensures SNMP messages coming from the agent, such as the Raven, have not been modified and the agent may not be queried by unauthorized users. SNMPv3 uses a User-Based Security Model (USM) to authenticate and, if desired or supported, message encryption. USM uses a user name and password specific to each device.

Management Information Base (MIB)

The management information base (MIB) is a type of database used to compile the information from the various SNMP agents. Reports from various agents, such as the Raven, are sent as data in form designed to be parsed by the NMS into its MIB. The data is hierarchical with entries addressed through object identifiers.

SNMP Traps

The trap is a “snap-shot” of the settings and status of the Agent’s device which is sent as a report to the NMS in a form that can be parsed and stored in the MIB.

Raven SNMP Configuration

To configure your Raven to work as an SNMP agent, you can use either Wireless Ace, or a terminal connection to configure the modem using AT commands (page 50). In Wireless Ace, the SNMP commands are all on the **Other** menu option.

There are only three commands to set for SNMP in the Raven: the listening port, the security level, and the trap destination.

Listening Port

*SNMPPORT sets the port for the SNMP agent to listen on. If set to zero, default, SNMP is disabled.

FIGURE 1. Wireless Ace: *SNMPPORT

Note: SNMP generally uses port 161, however most Internet providers (including cellular) block all ports below 1024 as a security measure. You should be able to use a higher numbered port such as 10161.

Security Level

*SNMPSECLVL sets the security level and which version of SNMP communications are used.

FIGURE 2. Wireless Ace: *SNMPSECLVL

0 - No security required. SNMPv2c and SMNPv3 communications are allowed.

1 - Authentication required. SNMPv3 is required to do authentication and SNMPv2c transmissions will be silently discarded. Authentication is equivalent to the authNoPriv setting in SNMPv3.

2 - Authentication required and messages are encrypted. SNMPv3 is required to do authentication. SNMPv2c and SNMPv3 authNoPriv transmissions will be silently discarded. Authentication and encryption is equivalent to the authPriv setting in SNMPv3.

User Name and Password

The user name is '***user***'. The user name cannot be changed. The Raven's password is used as the SNMP password (default is '***12345***').

Note: The eight-character password requirement for SMNPv3 is not enforced by the Raven's Agent to allow the default password to function. Your SNMP administrator or MIS may require you to change to a more secure and/or longer password.

To change the password in the Raven, select **Modem** from the top menu line in Wireless Ace.

FIGURE 3. **Wireless Ace: Changing the Raven Password - Menu Option**

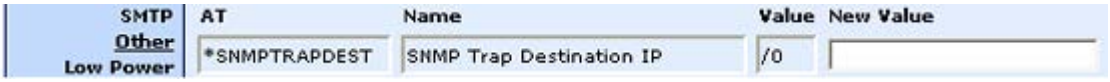
The current password will be pre-entered. As you type the new password and confirm it, the characters you type will be obscured by "x". For the password, you can use numbers, letters, and/or punctuation.

Caution: The password is case sensitive. "drowssaP" is not the same as "drowssap".

Trap Destination

*SNMPTRAPDEST needs to be set with the destination IP and port. If either are set to zero or empty, SNMP traps are disabled.

FIGURE 4. **Wireless Ace: *SNMPPORT**



Note: Traps are sent out according to the SNMP security level (i.e. if the security level is 2, traps will be authenticated and encrypted). Currently, the only trap supported is ***LinkUp***.

SNMP MIB Definition for AirLink

```
AIRLINK-MIB DEFINITIONS ::= BEGIN

IMPORTS
ObjectName FROM SNMPv2-SMI
MODULE-COMPLIANCE FROM SNMPv2-CONF;

org OBJECT IDENTIFIER ::= { iso 3 }
dod OBJECT IDENTIFIER ::= { org 6 }
```

```
internet OBJECT IDENTIFIER ::= { dod 1 }
private OBJECT IDENTIFIER ::= { internet 4 }
enterprises OBJECT IDENTIFIER ::= { private 1 }

airlink OBJECT IDENTIFIER ::= { enterprises 20542 }
general OBJECT IDENTIFIER ::= { airlink 1 }
common OBJECT IDENTIFIER ::= { airlink 2 }
status OBJECT IDENTIFIER ::= { airlink 3 }
gps OBJECT IDENTIFIER ::= { airlink 4 }

-- GENERAL --
phoneNumber OBJECT-TYPE
SYNTAX DisplayString (SIZE (10))
MAX-ACCESS read-only
STATUS current
   ::= { general 1 }

deviceID OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS  current
   ::= { general 2 }

electronicID OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS current
   ::= { general 3 }

modemType OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS read-only
STATUS current
   ::= { general 4 }

aleosSWVer OBJECT-TYPE
```

```
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS current
   ::= { general 5 }

aleosHWVer OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { general 6 }

modemSWVer OBJECT-TYPE
SYNTAX   DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { general 7 }

modemHWVer OBJECT-TYPE
SYNTAX   DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { general 8 }

-- COMMON --
date OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { common 1 }

otaProgrammingEnable OBJECT-TYPE
SYNTAX  INTEGER {
disabled(0),
enabled(1) }
MAX-ACCESS  read-only
STATUS  current
```

```
    ::= { common 2 }

devicePort OBJECT-TYPE
SYNTAX  INTEGER(0..65535)
MAX-ACCESS  read-only
STATUS  current
    ::= { common 3 }

netUID OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS   current
    ::= { common 4 }

netPW OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
    ::= { common 5 }

requestPAP OBJECT-TYPE
SYNTAX   INTEGER {
no(0),
yes(1) }
MAX-ACCESS  read-only
STATUS  current
    ::= { common 6 }

destinationAddress OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
    ::= { common 7 }

destinationPort OBJECT-TYPE
SYNTAX   INTEGER(0..65535)
```

```
MAX-ACCESS  read-only
STATUS  current
   ::= { common 8 }

serialPortSettings OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { common 9 }

serialPortFlowControl OBJECT-TYPE
SYNTAX  INTEGER {
none(0),
hardware(2),
software(4) }
MAX-ACCESS  read-only
STATUS  current
   ::= { common 10 }

-- STATUS --
ipAddress OBJECT-TYPE
SYNTAX IpAddress
MAX-ACCESS  read-only
STATUS  current
   ::= { status 1 }

netState OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS  read-only
STATUS  current
   ::= { status 2 }

netChannel OBJECT-TYPE
SYNTAX  INTEGER
MAX-ACCESS  read-only
STATUS  current
```

```
    ::= { status 3 }

rssi OBJECT-TYPE
SYNTAX   INTEGER(-125..-50)
MAX-ACCESS  read-only
STATUS current
     ::= { status 4 }

serialSent OBJECT-TYPE
SYNTAX  INTEGER
MAX-ACCESS  read-only
STATUS  current
    ::= { status 5 }

serialReceived OBJECT-TYPE
SYNTAX  INTEGER
MAX-ACCESS  read-only
STATUS   current
    ::= { status 6 }

hostMode OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
    ::= { status 7 }

powerMode OBJECT-TYPE
SYNTAX   DisplayString
MAX-ACCESS  read-only
STATUS  current
    ::= { status 8 }

fixObtained OBJECT-TYPE
SYNTAX  INTEGER {
no(0),
yes(1) }
```

```
MAX-ACCESS  read-only
STATUS  current
   ::= { gps 1 }

satelliteCount OBJECT-TYPE
SYNTAX  INTEGER
MAX-ACCESS  read-only
STATUS current
::= { gps 2 }

latitude OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
::= { gps 3 }

longitude OBJECT-TYPE
SYNTAX  DisplayString
MAX-ACCESS  read-only
STATUS  current
::= { gps 4 }

END
```

APPENDIX 5

Warranty Terms and Conditions

The following terms and conditions ("Warranty Terms") govern the warranty services offered to you ("Customer") by AIRLINK COMMUNICATIONS, INC. ("AirLink"), located at 3159 Corporate Place, Hayward, CA 94545, in connection with the sale and licensing of AirLink software and hardware.

Warranty Terms

Standard Software Warranty

AirLink warrants that the AirLink software ("Software") licensed hereunder will perform in substantial conformance to the applicable AirLink software specifications during the warranty period. The warranty period is ninety (90) days from the date of delivery of the Software to Customer. AirLink's sole obligation with respect to this express warranty shall be, at AirLink's option, to refund the license fee paid by Customer for any defective Software or to replace the Software with Software that substantially conforms to AirLink's applicable software specifications.

One Year Standard Equipment Warranty

For a period of one year from delivery, AirLink warrants that the hardware products ("Hardware") will meet AirLink's standard specifications and will be free from defects in materials and workmanship.

Optional Two Year Extended Equipment Warranty

If Customer has purchased this two-year extended warranty option, for a period of three years from delivery, AirLink warrants that the Hardware will meet AirLink's standard specifications and will be free from defects in materials and workmanship.

Optional Four Year Extended Equipment Warranty

If Customer has purchased this four-year extended warranty option, for a period of five years from delivery, AirLink warrants that the Hardware will meet AirLink's standard specifications and will be free from defects in materials and workmanship.

Warranty Conditions

Remedy

If under normal use the Software and/or Hardware (collectively, the "Products") prove to have any such defect and the Customer notifies AirLink of such defect within the warranty period, AirLink, at its option, will either repair or replace the same without charge. The warranty does not apply if the serial number label or any warranty voiding label has been removed or if the Product has been subjected to physical abuse, improper installation, or modification not authorized by AirLink, or if the Product was used in a manner for which it was not intended. Products will be accepted for repair or replacement upon written authorization and in accordance with instructions of AirLink. Customer will obtain a Return Material Authorization ("RMA") number from AirLink's Customer Support, fill out an RMA submission form, and enclose it with the product. Transportation expenses associated with returning such Products to AirLink will be borne by Customer. AirLink will pay the costs of return transportation of the repaired or replaced Products. Please contact AirLink's support group via email at support@airlink.com or telephone at 510-781-9760 to obtain an RMA number. Products deemed by AirLink to be DOA (dead on arrival) may be returned to AirLink for repair, at AirLink's expense, using the standard RMA procedures.

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DIRECTLY GIVES RISE TO THE CLAIM. THIS CLAUSE WILL SURVIVE THE FAILURE OF ANY EXCLUSIVE REMEDY AND THE EXPIRATION OF THESE WARRANTY TERMS.

General Conditions

AirLink shall have the right to assign any or all components of these Warranty Terms without the prior written consent of the other party. AirLink shall not be liable to Customer for any alleged loss or damages resulting from delays in performance (including for AirLink, loss or damages resulting from delivery of the Products being delayed) caused by any act of God, fire, casualty, flood, war, failure of public utilities, injunction or any act, exercise, assertion or requirement of governmental authority, earthquake, labor strike, riot, accident, shortage, delay in transportation or any other cause beyond the reasonable control of AirLink, and if AirLink shall have used its best efforts to avoid such occurrence and minimize its duration and has given prompt written notice to Customer, then AirLink's performance shall be excused and the time for performance shall be extended for the period of delay or inability to perform due to such occurrence. All notices and demands of any kind which either party may be required or desire to serve upon the other under the terms of this Agreement shall be in writing and shall be served by personal service or by registered mail, postage prepaid, to AirLink (Att: VP/Operations) at the address set forth at the beginning of this Agreement, and to Customer, at the address provided by Customer to AirLink on the applicable purchase order. If any provision of these Warranty Terms shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall in no way be affected or impaired thereby. The laws of the State of California shall govern these Warranty Terms. These Warranty Terms constitute the entire agreement between the parties hereto pertaining to the subject matter hereof, and any and all written or oral agreements heretofore existing between the parties hereto are expressly canceled and/or superseded. These Warranty Terms shall prevail notwithstanding any variance with terms and conditions of any purchase order. Any modifications of these Warranty Terms must be in writing and signed by a duly authorized officer of both parties hereto.

APPENDIX 6

Frequently Asked Questions and Technical Support

Many of these questions and solutions in the following sections come from AirLink Support.

Caution: Solutions should only be performed if you are experiencing the specific problem indicated and have the specific modem model number indicated. Some solutions are very specific to model numbers due to differing internal hardware.

FAQ Topics

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Power, Antennas, and Signal Strength

What is RSSI? Why is the RSSI for my Raven negative?

RSSI (Received Signal Strength Indication) is a measurement of the strength or intensity, not necessarily the quality, of the received signal.

The RSSI is measured in dBm which is the power ratio in decibel (dB) of the measured power referenced to one milliwatt (mW). One milliwatt is zero, therefore less than a milliwatt, common and ideal for cellular communication, is expressed as a negative interger.

What is the Proper RF Coverage for my Raven?

The optimal range for AirLink modems is an RF Coverage (RSSI value) of -60 to -95. RF coverage between -95 to -105 DBm will often still register, however functionality at this range can be greatly reduced and registration can become difficult. Any devices with an RSSI below -105 DBm will likely fail to register on a regular basis.

When addressing RF coverage ensure the antenna choice is appropriate for the device and frequencies required.

What Type of Antenna is Best for my Raven?

Antennas for cellular communication are commonly omni-directional and either dual-band or multi-band. They come in a variety of shapes and mounting confirgurations to suit several different types of needs.

While AirLink does sell a limited selection of antennas and antenna accessories, these are by no means all that are available or usable with your Raven. There are several suppliers of cellular accessories with a much wider selection of antennas designed to cater to a broader variety of situations.

Antennas selected should not exceed a maximum gain of 5 dBi under standard installation configuration. In more complex installations (such as those requiring long lengths of cable and/or multiple connections), it's imperative that the installer follow maximum dBi gain guidelines in accordance with the FFC's, regulations.

Dual-band

For cellular communication, the Raven requires a dual band antenna supporting both 800 MHz and 1900 MHz (1.9 Ghz) bands.

Caution: Single band antennas, such as those formerly used with a CDPD device, generally only support 800 MHz. Using a single band antenna can greatly reduce your ability to activate or use your Raven with Cingular.

Dipole

Dipole is a common antenna type connecting directly to the Raven and extending out in a single straight wire.

The short dipole antenna (also known as a "rubber duck") is a good desktop, portable antenna for use in areas with good signal strength and low electrical interference.

Mounts

Antennas can be mounted in a variety of ways (magnet, permanent, suction to a window, sticky tape, etc) which can allow you to move the antenna away from the Raven with a coax cable between the modem and the antenna allowing the antenna to be placed in a more suitable location for proper cellular reception: outside of a metal cabinet, the trunk lid of a car, a window, etc. A

mounted antenna can be placed in locations where the simple, short dipole antenna connected directly to the Raven may not perform at all.

Note: When using a cable with an antenna, there is a dB loss over the distance of the cable. It is possible to lose the full gain of an antenna while using a long cable to the modem.

What do I need to power my Raven ?

Your Raven is designed to work either with DC (commonly used in vehicles) or with an AC adapter (standard wall outlet in the US, Canada, and most other countries). The input voltage is 9VDC to 28VDC with an input current from 90mA to 350 mA.

If the modem is provided an inadequate power supply the following symptoms might be experienced:

- Modem will constantly power cycle while attempting to register
- Modem will register but will power cycle when data is transmitted/received
- Modem won't power on at all.

If these symptoms occur, verify the power supply meets the above mentioned criteria. If an AC adapter is being used; verify it is intended for the AirLink product in question.

Caution: If you previously used AirLink CPDP modems, you may have older power supplies that provide inadequate power and will cause the above mentioned symptoms.

Can I use a portable battery to power my Raven ?

It is possible to use a portable battery for your AirLink modem, however, you most likely need to make the connector from the battery to the modem yourself. The battery also needs to have enough power to be able to handle the power consumption of the modem.

You can contact AirLink Support for a guide on how to use your AirLink modem with a portable battery.

The Raven's IP Addresses and Local Networking

Why Can't I reach my Raven from the Internet? What is a Restricted or Private IP?

On Cingular's network, for security reasons, some accounts set up to be restricted to communication only from other devices on their network, called a Restricted IP or a Private IP. If you had two modems on Cingular's network, they could communicate, but your computer, not using Cingular as an ISP can't. You could normally still access the Internet using your Raven's restricted or private IP because the modem would use a proxy or gateway on Cingular's network.

However, if you need to be able to contact your Raven (or the devices behind it) directly, instead of a **Restricted IP** (also called **Private IP**, **Non-Routable IP**, or **Proxy APN**), you will need to contact Cingular your cellular provider to get your account changed to an **Unrestricted IP** (also called **Public IP** or **Internet APN**).

Note: Customized APNs are generally private and non-routable.

What is the difference between Private and Public mode?

When your Raven is powered on, ALEOS, acting as a PPP client, negotiates a PPP session with Cingular's network at the conclusion of which it is assigned an IP address by your cellular provider. How this address is further acted upon by the modem is determined by Private or Public Mode.

Public Mode (*HOSTPRIVMODE=0):

The IP address assigned by Cingular is passed on to the devices connected to the modem.

If there is a computer or device connected to the serial port of your modem, there are actually two PPP sessions taking place. After your modem receives Cingular assigned IP address, a second PPP session is established between your computer or device and the modem ultimately assigns that IP address to that computer or device connected to the serial port.

Private Mode (*HOSTPRIVMODE=1):

The IP address assigned by Cingular is not the address that is assigned to the computer or device connected to the Raven's serial port during the PPP negotiation or DHCP IP assignment. Instead, the computer or device connected to the Raven on the serial port is assigned the IP address configured in *HOSTPRIVIP and uses the IP address configured in *HOSTPEERIP to communicate to the modem.

How do I set up Private Mode? How do I connect to my Raven to my router or to Linux?

Private Mode is at times preferred or required to provide network connectivity to a Linux device, routers, or other devices. Private mode will generally also work with any PC in an environment where there is a need for the Raven to be configured to work with an internal network.

There are four AT commands you will need to set in the modem. You can set them using Wireless Ace or a AT commands with a terminal connection (page 50). The examples shown are from Wireless Ace.

***HOSTPRIVMODE=1 -** Private Mode turned on.

HOSTPRIVIP=[IP address***]** - IP address assigned to computer or other end device connected directly to the modem (example, 192.168.1.8).

HOSTPEERIP=[IP address***]** - IP address assigned to modem for local, not cellular, communication (example, 192.168.1.9).

HOSTNETMASK=[subnet mask***]** - Subnet Mask setting (example, 255.255.255.0).

The IP addresses configured need to be appropriate for your network. For most internal networks, using the IP range of 192.168.x.x is generally preferred. The first three parts (called octets) need to be the same for all devices on the network (such as 192.168.1.x), but you can use any number from 0 to 254 for the last part if you use a subnet mask of 255.255.255.0 (fewer numbers are usable with different subnets). The last part for each IP address on the network needs to be different.

The *HOSTPRIVIP and the *HOSTPEERIP need to exist on same subnet, the easiest subnet to configure is 255.255.255.0 which allows for 255 IP addresses on the same subnet. Unless you understand the complexities of subnetting or you are instructed to use a different subnet by your Network Administrator, it is safe to use 255.255.255.0 with an internal 192.168.x.x network.

Unless you are instructed to use a different IP range and subnet by your Network Administrator, using the 192.168.1.x or 192.168.0.x range with a subnet mask of 255.255.255.0 is recommended.

Caution: If the IP address of the device or computer connected to the modem is different from the one configured in the modem as the *HOSTPEERIP, communications will fail. If the Subnet Mask is configured differently in the modem than on the computer or device to which it is connected, you may not be able to communicate between them.

Security for the Raven

Does EDGE/GPRS provide any security?

While the structure of the EDGE/GPRS network provides data security, it is still recommended you use a VPN for additional data communication security.

For specific information about the security of Cingular's network, contact your cellular dealer directly.

If I change the password in my Raven and forget it later, can I still access the modem?

If you changed your password from the default, you can have your password reset by calling or emailing AirLink's technical support.

The support technician will ask you for a **Challenge Code** which you can obtain using Wireless Ace. You will be asked to send this information in an email to support@airlink.com along with your name and company. Password resets are tracked.

1. Start Wireless ACE: *Start > All Programs > AirLink Communications > Wirelss ACE 3G > Wireless ACE 3G*
2. Select *Modem > Reset Password*.

FIGURE 1. Wireless Ace: Reset Password

3. Note the Challenge Code shown (will be different than this screenshot).

FIGURE 2. Wireless Ace: Challenge Code

4. Enter the **Daily Password** provided by the AirLink support technician.

Note: The Daily Password will only work for the modem you requested, the copy of Wireless Ace you used to obtain the Challenge Code, and only for the specific time (approximately 24 hours).

AirLink Technical Support

If you encounter problems with operation of your Raven, AirLink's support staff can help.

AirLink Support Web Site

The AirLink web site is updated frequently with Setup Wizards, Utilities, How-To Guides, and other documentation: http://www.airlink.com/support.

AirLink Documentation and Guides

- **Modem User Guides** - These guides are specific to your modem type, cellular provider, and cellular technology and contain comprehensive information about the operation of the modem and its features.
- **Modem Quick Start guides** - These guides are also specific to the modem type, cellular provider, and cellular technology and are a step by step guide to activating the modem using the Setup Wizard or other steps as applicable.
- **Utility Guides** - These guides focus on the features of one of the AirLink modem utilities: Wireless Ace, AceView, AceNet, Modem Doctor, etc.
- **Application Notes** and **How-To Guides** - These guides detail configuring the modem to work with a specific feature set or how the modem can be set up to work with a specific 3rd party (non-AirLink) device.
- **Data Sheets** and **White Papers** - These are technology based information documents.

Contacting Technical Support

For support assistance please email support@airlink.com or call 510-781-9760 Monday through Friday 5 AM to 5 PM Pacific Time (8 AM to 8 PM Eastern Time). Support is not available weekends or holidays.